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JUNE

1924



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WEATHER AND HONEY PRODUCTION—J. H. Lovell

COMB BUILDING—Bruce Lineburg
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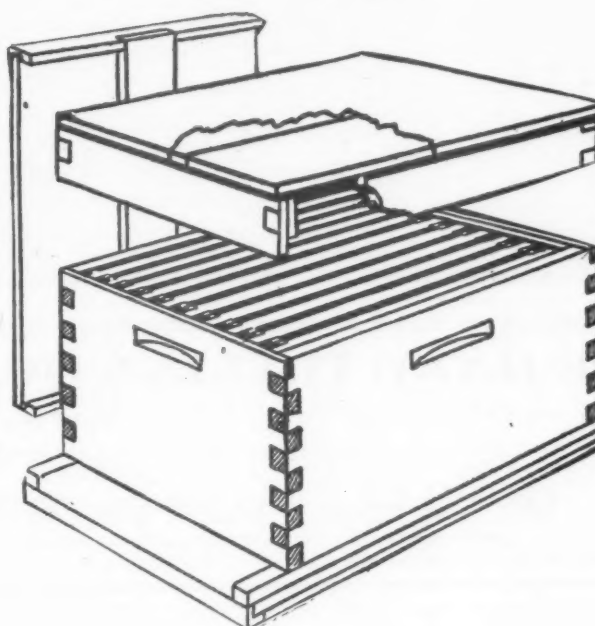
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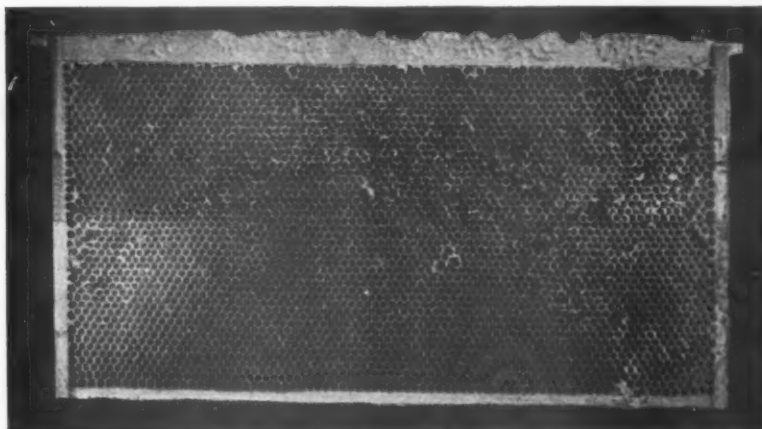
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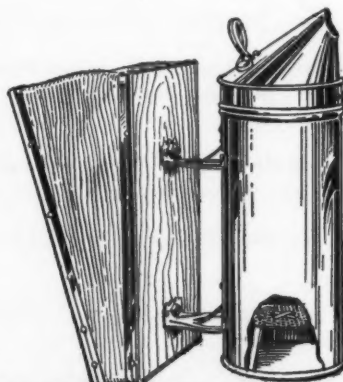
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The Diamond Match Co.'s Factories and Yards at Chico, Calif., cover 220 acres.

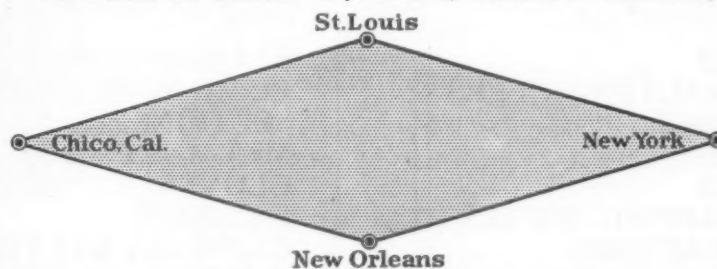
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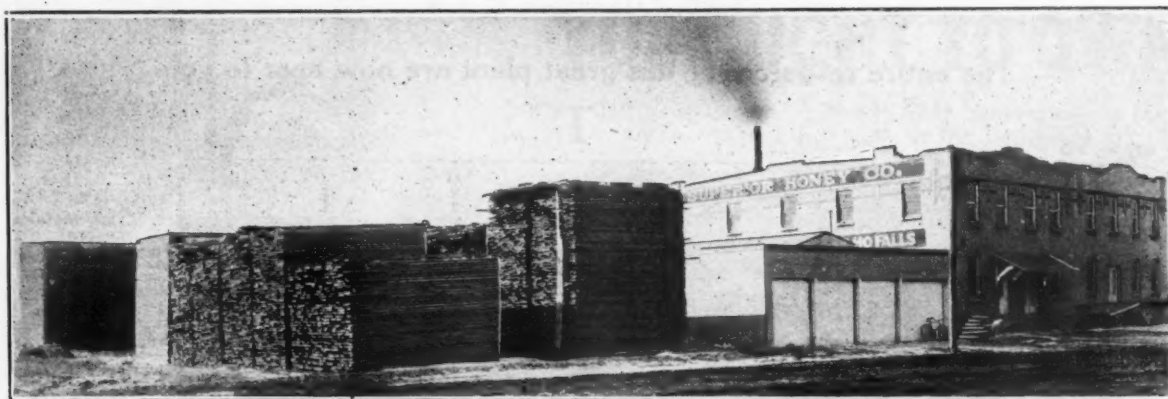
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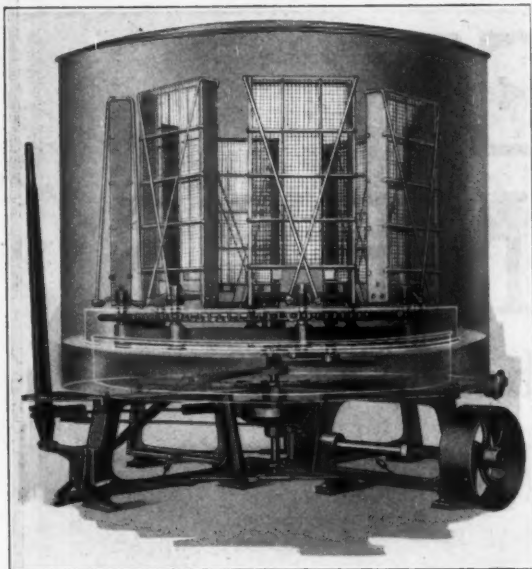
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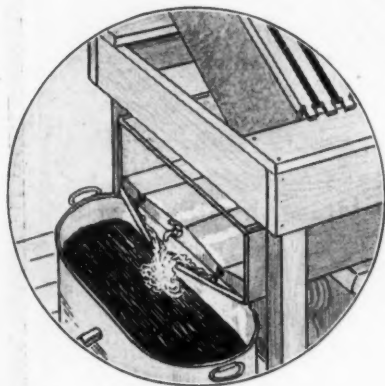
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AMERICAN BEE JOURNAL

VOL. LXIV—NO. 6

HAMILTON, ILLINOIS

JUNE 1924

COMB BUILDING

By Bruce Lineburg.

THE mandibles, legs, antennæ, and even parts of the proboscis, are used by the worker bee in the construction of comb. The wax scales are detached one at a time from the wax pockets on the abdomen and are passed forward beneath the body by the hind legs. The front legs then grasp the wax scale and pass it on to the mandibles. The mandibles serve to masticate the wax scale, to carry the wax from place to place, to deposit it, and finally to sculpture it into the form of cells. The antennæ are constantly in motion during comb building. Frequently they are in contact with the wax being worked, either for the purpose of inspection or to aid in its manipulation, or both. The convex surfaces of the maxillæ serve as a sort of mortar-board for the holding of masticated wax while it is being transported and until it is deposited where it is needed.

The distal end of each mandible is hollowed out on the inner side, giving it somewhat the appearance of a spoon (Fig. 1). This general shape serves several purposes, as will be seen later. Several modifications of this spoon-like structure are also of great importance because of their use in the manipulations of wax. These parts are considered as modifications since they differ, not only from corresponding parts of the queen and drone in the honeybee, but also from those of bumblebees and wasps.

The first of these modifications to be considered is a small portion of the ventral edge of the mandible. This portion of the mandible is bent inward almost at a right angle to the remaining margin of the mandible. This in-curving margin possesses a chisel-like edge. These sharp edges are the only portions of the mandibles which meet when the mandibles are closed normally (Fig. 1). Because of this fact they closely resemble the "cutting nippers" of the blacksmith. In fact they are used by the bee just as a blacksmith uses his nippers to trim horse hoofs or in cutting nails. Because of this similarity in form and use I have design-

nated them the "wax nippers" of the worker bee. As stated before, neither the queen nor the drone possesses these structures. Any partially masticated wax scale found on the bottom-board of a hive will show marks of the wax nippers when viewed under the microscope.

The other modification to be considered is a series of ridges running diagonally across the concave surface of each mandible. These "mandibular ridges" are three in number on each mandible and are almost parallel (Fig. 1). These ridges slope gently to the rear, but have abrupt faces toward the anterior margin of the mandible. They are useful in the mastication of wax scales and in the crushing of pollen grains. Because of their abrupt faces to the front and their gentle slopes posteriorly they enable the bee to force wax forward between the mandibles when the mandibles are moved back and forth over each other. These ridges grip the wax, just as the bit of a plane grips the wood when it is pushed forward, and, like the bit, they lose this grip when moving backward. This ability of the bee to expel masticated wax forcibly from the mandibles enables it to attach the wax to comb or other substances (Fig. 2).

A wax scale just removed from its pocket is almost transparent. This transparency is soon lost in the pro-

cess of mastication. During this process, the wax is reduced to a white, spongy mass which under the microscope resembles finely grated cocoanut. The whole mass sticks together tightly and will adhere readily to almost anything to which it is applied. This change in appearance and adhesiveness is due to the chewing which is given it by the mandibles and possibly also to the addition of a solvent added at the time of mastication. The presence of a wax solvent is not definitely established, although it is clearly seen that some fluid is being added during the process of mastication. This fluid may be seen readily under the microscope and is of sufficient quantity to be tested by means of a fine point of litmus paper. This test shows the fluid to be neutral or very slightly alkaline.

The stickiness of freshly masticated wax is a point that must be emphasized. Because of this, bees are enabled to attach their combs to almost any substance. It also enables them to handle such wax with little or no waste. A comb builder frequently has a considerable quantity of wax adhering to hairs, on the mandibles, on the maxillæ, or even on those of the front legs. These bits are apparently never lost, but are brushed together by the feet, tucked between the mandibles, and eventually find their way to the gen-

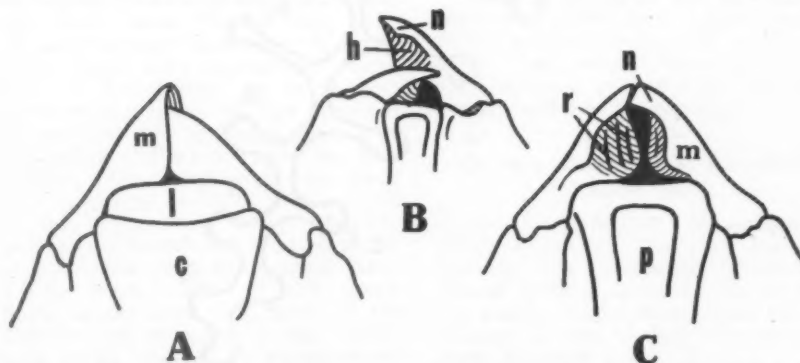


Fig. 1. Mouth parts of worker bee. A, dorsal view, showing the end of one mandible drawn into the hollow of the other as in chewing. B, showing the nipper or cutting edge of a mandible. C, showing the ridges in the hollow of the mandibles.

eral mass of wax, where comb is being built.

As a wax scale is chewed, the crushed wax is crowded back into the cavity formed by the concave mandibles. If the scale is a large one this masticated wax may be forced further back till a part of it rests on the convex surfaces of the maxillae (Fig. 2). Whether the two maxillae clamp this material between them in some manner or whether it remains attached to their surfaces because of its stickiness has not been determined. At any rate, the wax remains attached to the maxillae even when suspended below them. No masticated wax is ever found on the bottom-board.

After mastication the wax is deposited near points where construction is going on. Often it is deposited and later removed, only to be deposited again nearby. Probably but little effort is wasted by such removals, since the working over and rehandling of the wax makes it more pliable or otherwise more satisfactory for use. Usually, however, wax is deposited at the point where cell-walls or cell-bases are to be formed. As already stated, this is accomplished, not by dropping the wax at the point where it is required, but by squeezing it forward between the mandibles. The wax emerges in front of the mandibles in the form of a ribbon, which crumples up under the pressure which is applied to it as it is forced into place. No pushing or other pressure is applied directly to it by the mandibles, as is the case in the packing of pollen.

With an accumulation of masticated wax at hand, the actual construction of the sides and bases of

the cells is begun. First a ridge of wax is formed in approximately the position the side of cell is to take. This ridge is estimated to be from ten to twenty times thicker than the side of a finished cell. Wax is now removed by the wax nippers from both sides of the base of this ridge of wax. The wax thus removed is placed upon the top of the ridge and the process continued. The removal of wax from the sides continues until only a very thin wall remains supporting the thickened rim or coping (Fig. 3). This feature of comb building was observed by Darwin, who described it as follows: "We shall understand how they (the bees) work by supposing masons first to pile up a broad ridge of cement and then begin cutting it away equally on both sides near the ground, till a smooth, very thin wall is left in the middle; the masons always piling up the cut-away cement and adding fresh cement on the summit of the ridges. We shall thus have a thin wall steadily growing upward, but always crowned by a gigantic coping."

A strong coping is always present at any stage of the construction of cells. This coping is of greatest importance since it enables the bees to cluster and crawl over the combs without danger to the delicate cell walls. Combs with the coping removed from completed cells have been placed within a hive and the observation made that such cell walls will not support the weight of a single bee.

From the foregoing account, it will be seen that wax is handled a great many times. The piling up of the wax, the subsequent cutting away of

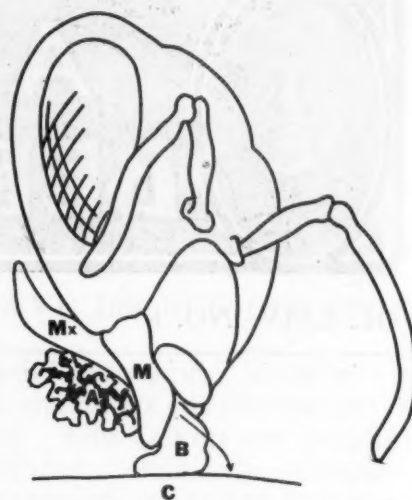


Fig. 2. Head of a bee, to show method of adding masticated wax to comb. MX, maxilla. M, mandible. A, masticated wax. B, wax being attached. C, Comb. Arrow shows movement of wax.

much of this material, the addition of this cut-away material to the top of the coping or even its transference to the coping of an adjoining cell has caused many observers to conclude that bees often work at cross purposes. This has led to the assertion that much or even all of the work of one bee is frequently torn down by the next worker. This idea is a misconception and is probably due to the fact that the exact process of comb building was not fully understood. In conclusion it might be stated that close observation of bee activities within the hive confirms the opinion that bees are not given to expending energy in useless work.

John Hopkins University.

RESOLUTIONS PASSED AT MARSEILLES INTERNATIONAL CONGRESS OF BEE-KEEPERS

Resolved: That selection of bees be undertaken in every country, for the development of the following qualities in the order of their importance: (a) prolificness of the queen to enable the colony to reach maximum strength for the honey crop; (b) honey production, with consideration of the manner in which it is sealed in the production of section honey; (c) hardness of the bees; (d) gentleness and ease of manipulation.

That selection be undertaken as well upon the drones as upon the queens.

That the beekeepers be urged not to sacrifice any of the above mentioned qualities for the sake of physical looks.

That each country be urged to organize an office of information, to keep the beekeepers informed as to the condition of the honey market.

That, in order to increase consumption, the beekeepers organize fairs and honey counters in all important centers.

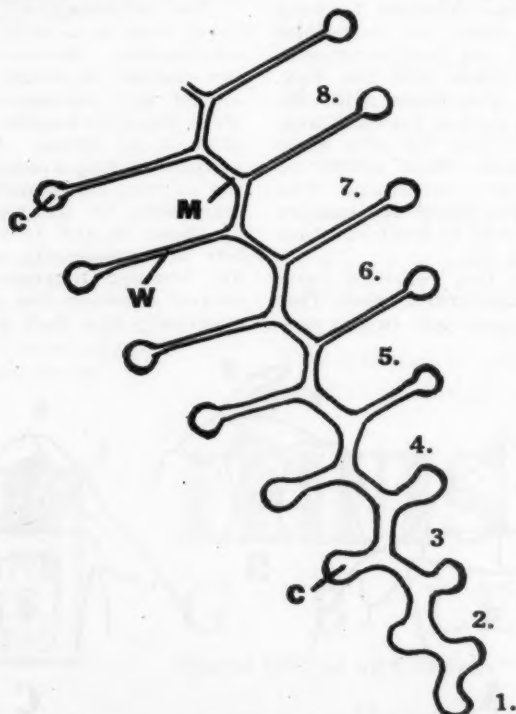


Fig. 3. Cross section of cells at different stages. 1, cell just started. 8, completed cell. C, coping. M, finished midrib. W, finished cell wall.

That a recommendation be made to the universities to insert in the formularies of therapeutics a recommendation for the use of honey in place of sugar, for the main reason that honey is a live sweet, containing all the vitamins of the plants from which it is extracted.

That in each country the greatest care be given to the devising of advantageous railroad tariffs, for the shipping of bees, and that custom house formalities be expedited to avoid delays in transmission of living bees.

That, in the primary schools, the children of both sexes be informed concerning beekeeping, especially by the examination of colonies of bees, with intuitive methods; that in all primary and higher grades the study of botany be instituted, in order to facilitate the knowledge of honey-producing plants, so that a preference, in cultivation of fields and gardens, be given to them, as well as in the growing of forests.

That the teaching of beekeeping be spread by professors employed in extension work, in courses or in occasional lessons.

That conferences be organized during the favorable months by visiting farmers and country people, to show them the advantages of the cultivation of bees.

To insert in the programs of the schools of agriculture, horticulture, small rural industries and normal schools, complete courses in beekeeping, to educate professors who may teach adults in the culture of bees.

Create aparian schools, with regular apiaries, either permanent or changing from year to year to different locations.

Organize a complete program, based upon science, to prepare professors and to arrange an elementary program of the matters to be taught.

Create entomological bureaus, with all necessary paraphernalia, to facilitate the study of the bee, its diseases, etc.

To teach by pictures, with illuminated projections, fixed or moving pictures, which are always an attraction for the uninitiated. That there be an exchange of such films between different countries.

To demonstrate to the public the advantages secured by the help of bees; crops, fertilization and consequent increase of fruits, added enjoyment in the leisure hours of the working people.

That each country be urged to create aparian stations, for the scientific study of bees, especially of their diseases.

That, in each country, the shipping of bees be permitted only when accompanied with a certificate of immunity.

That, in each country, inspectors be trained to care for diseased colonies, especially foulbrood, in their locality.

That, in each country, laws be passed to compel owners of diseased bees to make a statement of it to the authorities, so they may be treat-

ed, or destroyed if the treatment is inefficacious.

That, in each country, a mutual insurance organization be created against bee diseases; such insurance joined to a central organization; the funds to be supplied by the members and by state allowances.

(The above resolutions, passed at the Marseilles Congress of 1922, will undoubtedly be given consideration at the Quebec Congress, September 1 to 4. It is therefore important for all interested beekeepers to be present and help either to adopt them or to change them, or to add other resolutions.—Editor.)

TRANSFER FROM SMALL TO LARGE HIVE

By H. A. Mark.

In the transfer from movable frame to larger hives with frames containing full sheets of foundation I have found the following method very practical during a honey flow.

Prepare as many top bars the size of the top bar of the large frame as there are small frames containing brood. These temporary top bars need not be more than one-fourth to three-eighths inch thick, and if wider than the top bar of the small frames notches will be required cut in their sides opposite the supporting ends of the small top bar. Lay one of these temporary top bars on top of a small frame containing brood and bind the two together by wrapping around the two at the supporting points of the small frame with twine or fine wire and tie securely. If there are many colonies to be transferred, so the temporary bars will be used repeatedly, it may be well to fasten in small "L" shaped blocks of wood on the lower side of the temporary bar for supporting the small frame; or, this can be done by using small "L" shaped screw hooks, such as small curtain rod hooks.

With these temporary top bars attached to all frames containing brood of the small hive, set this hive to one side and in its place set the large hive. Transfer these prepared frames from the small to the large hive, supporting them in it from these temporary bars. Begin with the frames containing the most brood and divide these frames into pairs and between each pair insert a frame of the large hive containing a full sheet of foundation, up to the capacity of the hive. If this does not fill the hive, add the large frames of foundation at the sides until the hive is filled. Over the large hive body place a queen excluder and on this set the small hive body, properly spacing its remaining frames at its center. The remaining space need not be filled. Put on the cover. Place boards over that part of the excluder not covered by the small body, so as to close all openings except the entrance to the large hive.

The bees will at once begin to draw the foundation opposite the brood

and the queen will follow with eggs. After the queen starts laying in the large frames, as fast as the brood in the small frames is capped they may be raised to the top body and placed over the brood below, and more of the large frames with foundation inserted below, being careful to leave the queen below and place the added frames so they will come between frames containing unsealed brood or eggs. Continue to raise frames and add foundation until the transfer is complete. The rapidity with which this can be done depends on the strength of the colony. Be careful to not leave a small frame between two large ones after they are all drawn out, for the bees will be likely to build the small frame down below its bottom bar to make it match the large frame.

In the transfer from standard Langstroth or divisible frame hives to Jumbo hives the same plan is used, only the temporary top bars are not required.

Nebraska.

HOUSEHOLD EXPERTS BOOST HONEY

The caloric value of honey is good and it is one of the foods that should be eaten in winter, according to Jane Eddington the household science expert. In telling of the good use of honey, she says:

"The accident of having a strained honey of superior quality—not dark and strong—led me to try it over a plain mold of cold white cornmeal with some whipped cream topping all. It made an exceedingly palatable dessert and, as each of the three elements belongs to the caloric bearing foods, it was nearly half a dinner from that standpoint. The white cornmeal, because it is cooked in so much water, yielded about fifty calories per rather large portion, honey about the same and cream not more.

"As a contrast to this, consider a custard. The sugar in it is a caloric food but the main food value in it, or that of the milk and eggs, is the same in the diet as that of meat, fish or cheese—protein, a food we need but a small portion of per day for repair if we are grown.

"Now is the time for all sensible persons to stoke their human engines well. It is no longer safe or sensible to eat spare meals. Keeping our energy balance means that our vital powers will not be depleted."

German Publication Advertises Yearly Price

The "Archiv fur Bienenkunde," which is one of the very finest of German bee publications handling special articles scientifically, is quoting yearly subscription rates to beekeepers in the United States at a price of \$2.00 net.

Anyone interested should send their subscriptions to Theodor Fisher, Freiburg in Greisgau, Germany.

AMERICAN BEE JOURNAL

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THE AMERICAN HONEY PRODUCERS' LEAGUE

The April number of the "League Bulletin" contains a financial report which gives evidence of activity. The present officers are efficient and the beekeepers are surely beginning to realize that there is need of co-operation. If this is kept up, we will have evidence of success before long. We need to remember that it takes perseverance to achieve anything and that we cannot expect our dollars to come back to us immediately, with institutions of this kind. Every beekeeper ought to be a member of the League, either directly or through his state organization. "United we stand, divided we fall."

PROPOLIS

In the present number the reader will find a short statement from Mr. Alin Caillas of Paris, whom some of our old subscribers will remember as a contributor. Mr. Caillas is a chemist and has written some very interesting things. He now shows us that propolis contains about thirty per cent of beeswax. The question which comes to our mind is whether this proportion is in any manner regular. We do not believe it; for we have heard beekeepers say that propolis contains no beeswax and yet we have rendered a considerable amount of beeswax out of so-called propolis. There is a great difference between the two, when melted in water, the beeswax being lighter and the propolis heavier than water. This specific gravity is very perceptible. The two separate easily.

Huber, in his *New Observations*, published 125 years ago, wrote an entire chapter on this subject: Chapter VI, of the second volume, on the "Completion of the Cells." Since the editor has translated the whole of Huber's works over again, he awaits only an opportunity to publish the book, when printing and paper become a little cheaper. Meanwhile, it may be good to make a few quotations from this wonderful writer, for he wrote after careful tests. Do our readers consider this matter worth going into?

RECOGNITION OF COLOR BY BEES

In a letter dated May 10, 1879, Mr. Bertrand, the Swiss publisher, who corresponded regularly with Charles Dadant, wrote him:

"Concerning the question raised at one of your American conventions whether bees are guided by the shape and color of objects, I made, last season, at my apiary in the mountain (Gryon elevation 2420 feet) an observation which indicates that color has more importance than shape. I had 4 Layens hives in a row, installed, 6

feet apart. I hived in one of them, the second in the row, a swarm of Italian bees, purchased in Mendrisio, Italian Switzerland. This was a yellow-colored hive. The hives on both sides of it were painted in dark brown. The fourth hive was also yellow. Well, during the first few days after the hiving of that swarm, the bees, somewhat confused, wandered around more or less. Only one or two of them went to the dark-colored hives, which were nearest to their own hive; but so many of them entered the other yellow-colored hive, although farther away than the others, that I found it necessary to close it temporarily. The hives were exactly alike in shape. It was only the color which made any difference."

Those of our beekeepers who have only common bees will readily notice how easy it is to make such remarks as the above, if Italian bees are introduced. It was the introduction of Italian bees in his apiary which enabled Dr. Donhoff, years ago, to make the careful remarks by which he noticed at what age bees take care of the brood, build comb, and go to the field. The above mentioned experiment of Bertrand was made when he secured his first Italian bees. This gave positive information.

TRY TO DO BETTER

I have sought, all my life, to do better, to improve upon myself in any possible way. This is really, to my mind, the happiest mode of living, since there is no such thing as perfect happiness. If we can improve, even ever so little, upon our methods, our habits, our friendships, is it not better than trying to get ahead of everybody, by making more money than others do? Take the best possible care of your bees, produce the very best possible honey, put up in the neatest possible shape and let the rest take care of itself, for when you do that, you also give contentment to others around you. And the bees will thrive too."—(Edouard Bertrand, of Switzerland, in a private letter, 1884).

ARE THE CYPRIAN BEES CROSS?

Our experience with the Cyprians was that they were exceedingly cross, so we did away with them. But some people suggest that we might have had hybrids. That is true. But Frank Benton, the American who went to Cyprus and remained there several months, and who claimed that pure Cyprian bees were not difficult to handle, sent some, from Cyprus, to Edouard Bertrand in Switzerland, in 1884. A letter from Edouard Bertrand to Charles Dadant, dated October 8th, 1884, contained the following:

"As to the Cyprian bees, they are irregular. Those that I received from Benton, in Cyprus, are devils and produce nothing. All I can do in their favor is to say nothing about them and let others do the talking. I don't want any of those bees in my apiary. Perhaps the climate does not suit them."

ACARAPIS WOODI

The "Journal of Economic Entomology," in its April number, contains an article from the pen of Dr. E. F. Phillips, calling attention to the discovery of *Acarapis woodi*, the mite of Isle-of-Wight disease, in Czecho-Slovakia, living freely on combs containing pollen, "which had not been within a hive of bees for at least a year." As there has been no complaint in that country of an epidemic similar to that of Isle-of-Wight, we are rather confirmed in our views that the disease in the British Isles had to be induced by a concurrence of circumstances, favorable to the very extensive development of the mite. In May disease and paralysis, pollen has often been accused of being the original carrier of disease. We may yet find some such mite in the combs where paralysis is in existence. Time will tell. These diseases are found, at one time or another, in every part of this continent; but never in such harmful spread as the Isle-of-Wight disease was in the British Isles for a few years.

BEEES MOVING EGGS

The editor may be excused for disbelieving that bees move eggs, because, by carefully watching eggs that had been placed in out-of-the-way cells, he never saw any that produced workers. Those eggs always turned out to be drones. For that reason, we have thought that eggs that are unaccounted for have been laid by some industrious drone-laying worker, even when the colony has a queen. As a matter of course, we cannot pass upon what Mr. Holterman has seen and reports in the May number. But whenever you find eggs that appear to have been carried from elsewhere, watch them and see what hatches out of them.

Our view of this matter is strengthened by what was published on page 158 of the very first year of the American Bee Journal, in an article entitled "Fertile Workers," I will quote:

"Freshly laid eggs have been found within four days after the removal of a queen; and Dzierzon records one instance where a fertile worker laid eggs in a hive which contained a fertile queen."

Both Dzierzon and Samuel Wagner, who quoted him, were exceedingly careful men, and we may well accept their statements.

BEEKEEPING IN OHIO

This is the title of a very nice bulletin published by the Agricultural College Extension Service at Columbus, Ohio. It gives splendid instructions on handling bees and regarding diseases. But there is an oversight in the "Rearing of Queens," on page 21, in advising to wait ten days before counting the queen cells of a queen-rearing colony. We have to wait another day before we can insert these cells in either nuclei or queenless colonies. By that time, the first queen may have hatched. We must wait only nine days, after the colony is made queenless before counting our queen cells. Then we can use them on the tenth day. This is important, as queen cells often hatch very promptly on the tenth day.

In this same number, the reader will find an article on "Making Increase," in which I tell of having had a number of queens hatch in the afternoon of the tenth day, while delivering them, on horseback, 55 years ago. This little event printed the necessary date very forcibly in my mind, so that I remember it better than if something similar had happened only a year or two ago.

AMERICAN LINDEN IN EUROPE

"Several of us in Switzerland wish to propagate your American basswoods. Mr. Thos. W. Cowan brought us some Canada basswood honey which is lighter in color and finer in flavor than European basswood honey. This justifies the good opinion of basswood honey which you entertain but which is not appreciated here.

"So Mr. Barbey and myself would like to undertake the growing of *Tilia americana* on a large scale, to distribute the trees in the vicinity, both in private properties and in the commons. Can you secure the seed for us? If there are several varieties, we should like to have some of each."—(Edouard Bertrand, in a private letter to Chas. Dadant, September 11, 1888).

According to Gray's Botany, there are three varieties of *Tilia* in the United States.

Tilia americana, linden, basswood, also called lime-trees; leaves large, green and glabrous.

Tilia Michauxii, also called pubescens; leaves smaller, pubescent and grayish-green beneath.

Tilia heterophylla; leaves large, smooth and bright green above, silvery-whitened, with a fine down underneath.

The light color of basswood honey is generally acknowledged; but the flavor is not liked by everybody. Our impression is that where the honey is mixed with white clover, it is best suited to most people's taste.

PROVINCIAL EXPOSITION

We have received from Quebec a large calendar for wall use giving the announcement of a "Provincial Exposition" from August 30th to September 6th.

This is another inducement for beekeepers to attend the International Congress at Quebec during the same week. We will not only meet beekeepers from all over the world but we will see the products of beekeeping in the northeast of North America, and probably some of our own products in competition. The Congress is being advertised very thoroughly in Europe. The only drawback is the low value of European exchange, which will make a trip across the Ocean appear very expensive.

THE MID-WEST HORTICULTURAL SHOW

The Mid-West Horticultural Exposition will be held at Waterloo, Iowa, next fall. It is the one show held at regular intervals, open to the beekeepers of all America, where apiary products are featured. It is the hope of this Journal that American beekeepers will arrange to save their best honey this year for display at the Mid-West. If you cannot be present at the show, arrangements will be made to care for your exhibit. The premium list is now being prepared and will be sent to all who apply to Prof. F. B. Paddock, of Ames, Iowa, who is superintendent of the apiary department.

TOURING CLUBS

On page 222, May number, the editor had something to say about a recommendation of the Touring Club of France to the hotel keepers of the touring resorts, to serve honey to their guests, as they do in Switzerland. He had added something in praise of this particular organization, but evidently the printer did not think it proper for a bee magazine, for he cut it out and left the sentence unfinished.

But the Touring Club of France, in its next number, is again recommending the use of honey and mentioning honey as a "national wealth" and the great economy that it brings to the people, since it does not require a great outlay of money for bees to produce it and is a very valuable food, better for the health of the consumer than any of the artificially made sugars. This gives us the occasion to insert what we were about to say when the printer cut us short. It is that the "Touring Club of France" is not a money-making organization, but a mutual, devoted, fraternal institution, very beneficial to its members. We joined it in 1913, when visiting Europe. Our number is 279,500; so there are several hundred thousand members and we saw fit to keep up our membership, for it costs only ten francs (about 70 cents) a year. Those of our friends who go to the Continent of Europe should not fail to become members of this institution. It is organized for the convenience of the public and is recognized as a power for tourists all over Europe. We should have something of this kind in the United States, something entirely independent of railroads, hotels, steamships, etc., but looking only for the benefit of its members. Now, printer, don't cut this out.

DRONES GIVE THE TEMPER

In the article on Inheritance of Temper, in May number, page 234, Mr. Axel Holst adds another testimonial to the already expressed opinion that the drones give the disposition to gentleness or ill-nature to the progeny.

It is, therefore, very advisable for our beekeepers to follow the method which Grandpa Dadant followed: Send your boys to the neighbors' apiaries and have them Italianize those bees. The neighbors won't object, if they have any common sense, and you will be doing them some good and yourself even more.

SUPERING

By Allen Latham.

FOR some years now the cry has been, "Give the bees room." Indeed, there was need for this cry to be broadcasted. The supply catalogs had managed to get it into the amateur beekeeper's head that a complete hive consisted of one brood body and one super. The farmer-beekeeper was satisfied if he got his one super filled, or had I better say he was lucky. The advice to have at least five comb honey supers per colony was and is good.

Careful study and deduction during the past year or so have convinced me that the time is ripe now to sound a warning in regard to the use of these five supers. I feel assured that their misuse is as serious as their non-existence.

In previous articles I have advanced theories as to the cause of swarming, offering as the primary cause the residual sex-instinct still existent in the worker bee, but leaving for the immediate cause a variety of irritating conditions or environments. This article is to enlarge upon the irritation which the colony undergoes through the misuse of super room.

Probably the chief immediate cause of swarming is congestion of graduate nurse-bees in and about the brood-nest; and the surest direct control of swarming lies in preventing or promptly relieving this congestion. Knowing the foregoing facts, beekeepers have been urged to give more room, and as usually happens with zealous humans, the thing has been overdone. Paradoxical as it may seem, it is the moderately strong or "coming-on" colony which is the most likely to feel this congestion and to get the swarming fever.

The normal colony, with its vigorous queen, has environmental conditions so far different from those of the colony which went into winter quarters under adverse conditions that it would be well to dwell a moment upon this difference. The normal colony in spring advances its broodnest into its stores, replacing the consumed stores with brood. Few, if any, empty cells lie in or close to the broodnest. Every pleasant spring day which offers stores for the bees sees the new pollen and new honey in such a colony placed in cells not close to the brood or within the broodnest itself, but in combs outside the nest, as in those combs are the only available empty cells. Contrasted with this condition, consider the colony which goes into winter short of stores. The spring broodnest has empty cells all about it. The growing nest advances into empty comb, if it grows at all. Each pleasant day sees its new stores in the case of this colony placed close to the brood. The brood is encircled with these new stores.

Now there may be nothing in what

I have pictured in the preceding paragraph, but to me there lies therein a great truth for the successful beekeeper. The normal colony acquires early the habit of placing its new stores out and beyond the broodnest; the other colony acquires the habit of cramping the work of its queen. Now let a prosperous spell of weather and bloom come. The normal colony jumps right into the habit of honey-storing; the other colony is immediately congested and starts cells.

It was long a puzzle to me to account for the swarming of colonies of mediocre strength while I could so easily get my big colonies started in on the storing habit. I think I now have the explanation. Put this under your bonnet and ponder it: The size of the hive is the size of the broodnest and its surrounding activities. Any space other than that, though enclosed by wooden walls or other material, is not a part of the home of the bees, though one may call it hive.

To cope with this congestion problem is the work of the successful beekeeper. To give room only as the colony will accept the added room as a part of their home is a task to try our skill. Added room may make the accepted home of the colony smaller rather than larger, whereas it is imperative that any added room should make the colony home larger if we are to have success.

In no part of beekeeping is skill so essential as in the wise adding of supers. One must be intimately acquainted with bees and bee behavior in order to diagnose each colony and correctly determine when a super should be added and where that super should be added. We add supers to give room for honey-storing and to relieve possible congestion. How often it happens that the added room causes congestion instead of preventing it!

Here is a colony which has labored along and is barely occupying the room already given it. Along comes the beekeeper and lifts off the one super there and puts on an empty and then replaces the other at the top. Consider a moment this colony. Below is a large broodnest with no crowding of bees, and in the top super a few thousand bees barely occupying it. In between is an entirely empty super. When will such a condition bring disaster, and when will it be safe?

If in the broodnest are many thousand ripe brood cells which will within twenty-four hours add their inmates to the colony, it is possible, provided the weather is warm and nights are not cold, that the emerging young bees will crowd enough nurse-bees out into the new super to avert disaster. There are, however, too many ifs. The chances are about nine out of ten that the bees isolated in the top super will desert

the super the very first night and crowd into the broodnest. The added super is new and not recognized as their home, and they will be slow to adopt it. We have then a congested broodnest because of that added super. Cells will at once be started.

It would have been much wiser to add the new super above, and still more wise to make that addition not direct, but over an inner cover with an escape hole. Within a few days graduating nurse-bees will go up through the hole and start work in the new super. This super may now be placed below with comparative safety and another empty one put in its place.

With a powerful colony, one can more safely give room at once, but even with the powerful colony it is often well, especially in localities of irregular flow, to add above and manipulate as the work proceeds. Bees are creatures of habit, and once you get them to storing outside the broodnest you can keep them doing so by the exercise of good judgment tempered with patience.

Connecticut.

SPREADING FOULBROOD

By E. G. Carr.

I do not recall having seen in print a word of caution regarding the possible spread of American foulbrood by hiving swarms on drawn combs.

One beekeeper of my acquaintance, operating about two hundred colonies, had this disease spread all through his apiaries because he gave a "tramp" swarm a set of combs. This colony was supered for extracted honey and, before the disease was noticed in the broodnest, the filled super was removed and extracted together with about one hundred others, giving a good opportunity to contaminate the whole lot with foul honey.

I feel, Mr. Editor, it would be wise, in view of the widespread occurrence of American foulbrood, to caution everyone that, unless they can be positive a swarm has no contaminated honey with it, to always hive it on foundation.

If by any chance disease was present, no doubt it would disappear in comb-building process. Even should the swarm have with it only perfectly clean honey, no appreciable loss to the beekeeper would occur, since bees which have swarmed are in condition to build a set of combs at minimum cost.

Some years ago W. Z. Hutchinson, by a series of experiments, proved that hiving on drawn combs always resulted in a reduced crop when working for comb honey.

Each year American foulbrood appears in hitherto disease-free territory, making it increasingly difficult to say when a swarm has only disease-free honey. Under these circumstances it would seem best that it be made an invariable rule to never hive a swarm on drawn combs.

MAKING INCREASE

By C. P. Dadant.

I AM asked to give a good method of making artificial increase of colonies. As there are many different ways, praised by different writers, and as most of these methods are good, it may be best to give simply the rules that should govern the making of nuclei, divisions, artificial swarms, etc., leaving the reader to select the one best suited to his circumstances.

1. In all our manipulations of bees, we should bear in mind that brood needs warmth and food; that the food suitable for the hatching eggs is produced by the nurse bees and that a colony containing only old bees will have difficulty in taking care of the brood. So enough young bees must accompany the brood, or hatching bees must be included in the putting aside of brood combs for increase.

2. After bees have taken their first flight, and have learned the location of their home, they will return to that spot naturally and invariably, when the hive is moved. The only way in which bees which have had one or more flights may be forced to learn a new spot is by putting them in the condition of swarming bees, with enough excitement to teach them that their home is changed. It is very interesting to note that the bees of a swarm, after that swarm has left the hive and clustered, will learn to consider any new spot as their home. So if we move field bees from the spot occupied by their home, we must apprise them of the fact in a way that will make them learn the new location.

3. Queenless bees will build drone comb, almost invariably, and in some cases they will continue to build drone comb until the young queen is fertile. When we made artificial increase before the advent of comb foundation, this matter was of great importance, for the colonies which were rearing queens would build immense quantities of drone comb if they were given empty space. The man who divides a colony, taking away the queen with much of the brood, and leaves upon the old stand all the field bees, and combs to build, even with guides of worker comb, makes a tremendous mistake, for his combs will be more than half drone combs.

4. The cost of comb, to the bees, is enormous. We have been told, by early experimenters, that combs cost next to nothing to the bees; this was because those experimenters did not realize that the bees of a swarm nearly all have wax scales, already produced upon the crop of the colony previous to swarming. Those bees can build a lot of comb, apparently without much expenditure of honey. But if they were to take the same number of bees from a colony, when their wax-producing organs were empty, they would realize that wax

costs as much to the bees as fat does to cattle and that it takes probably an average of ten pounds of honey to produce a pound of comb, besides the time spent in building. So it is very profitable to use comb foundation, or better old combs if they are worker combs, in good shape and free from any disease. When foulbrood was unknown in these parts, we used to buy combs of dead colonies anywhere and use them for making divisions. This was very profitable.

5. Powerful colonies, at the opening of the honey crop, are the ones upon which we may depend for surplus. Therefore, unless we want only increase, it is best not to use these powerful colonies for increase. It has always been the method of the writer to take the brood for queen cells from the best queens, i. e., from those that had given the largest crop the year before; but the bees and brood were always taken from middling colonies, colonies which were rearing plenty of brood, but brood which would hatch too late for the bees to be useful, as harvesters. Those are the colonies which may be used profitably in making increase, while we secure the best of our crop from the colonies which are ready at the opening of the harvest.

6. It is well also to bear in mind that it takes 21 days for worker bees to emerge from the time the egg is laid. Those workers do not at once go to the field. They remain in the hive about a week, before they take their first flight. Then they delay another week before becoming active field workers. This was originally found out by Dzierzon, when he first introduced the Italian bees. His observations were confirmed by us as well as by many others. So there is no doubt about these facts. However, when we disturb our colonies, take away most of the field workers, the young bees, on the impulse of necessity, will often become field workers earlier than they would have done in natural circumstances. But these rules are important for the beginner to learn. I say "for the beginner," but I have seen experienced beekeepers who either disregarded them or were ignorant of them and made artificial increase difficult for their bees, since very young bees do not go to the field and very old bees cannot nurse the brood, for their pap-producing glands are atrophied, while the young bees produce pap, or royal jelly, as we used to call it, readily.

7. It is perhaps well to remind the reader also that it takes from 15 to 16 days for a worker egg to be changed to a queen, from the time the egg is laid. But when we make a colony queenless, as the bees usually select larvæ three days old, from which queens are reared, and as the eggs remain three days in the form of eggs, we must count upon the

young queens hatching almost exactly ten days after the colony has been made queenless. I remember that, when I was about 18 years old, we took queen cells, one afternoon, from a colony which had been made queenless ten days previously in the forenoon, and I carried them, horseback, in a small cardboard box, on cotton batting, to a friend four miles away, and four or five of those queen cells hatched on the way; beautiful queens and quite lively. Perhaps someone will wonder whether it is the correct thing to do, to transport queen cells on horseback. There is no danger if one does not have a restless horse, and old Fanny was very quiet.

Some beekeepers express the opinion that queens are best that are treated as queens from the minute the egg hatches. I acknowledge that this is not my experience. I have always found the best queens to be those that hatched first, at the end of the ten days, when they had been treated as ordinary workers until the third day of their grub life. For that reason I was quite willing to agree with the scientists who first said that all the jelly or pap given to bees is of the same quality as the royal jelly, the change in its quality taking place after the larva has passed its third day.

This article takes it for granted that you will rear your own queens. I know it is much easier to buy your queens from a reliable breeder. But, on the other hand, when you breed your own queens, you know exactly what kind of stock you have, though you may not be sure of the drones, unless you did as my father had me do, in my young days, italianize the bees of the neighbors, so that their drones might be of the best. This is the only way in which you may be sure of proper matings.

If you rear your own queens, do not make your increase, except nuclei, until your young queens are laying. Then it is not difficult to follow the advice of J. E. Crane, page 234 of 1923, May, American Bee Journal. I might tell you here that you will never make a mistake when you follow the advice of Mr. Crane, for he not only has experience, but he is a successful man.

Perhaps I ought to tell here what method I like best in making artificial increase. It is to make a swarm from two colonies. But first we must either buy queens or rear our own queens. When the young queens are laying or have come to hand, we take from a colony the greater part of its brood, with most of the young bees adhering to it. If convenient, we prefer to remove the brood that is nearest to hatching or emerging.

The hive containing this brood is put on the spot occupied by another colony and the latter removed to a new spot. In this way we make one swarm from two colonies, taking the brood from the one and the field bees from the other. The hive from which the brood is taken, still having its queen, some young bees, and all its

field workers, soon recovers, especially if it is supplied with comb foundation. The swarm has a lot of brood, a queen, and all the field bees of the third hive. The latter, being placed on a new spot, loses only its field bees. In a week or two it has recovered its strength, though it could not be expected to produce much surplus honey, since its field bees are gone.

Some beginner may think that this is not a fast enough method of mak-

ing increase. But when we take so little from each colony they are just that much sooner ready to furnish more bees or more brood. Sometimes we move the same colony three or four times in a season, at each time giving its field bees to a weaker colony. There is absolutely no danger of bees fighting during a honey crop when strange bees are given to a division; field bees coming home loaded are always welcome.

Lord Lieutenant of Orkney and Shetland, a signal honor, the significance of which I despair of making clear to American readers. Sir Watson has written many works on surgery, the most important being a *Manual of Surgical Treatment*, in six volumes. He has written nothing more on bee disease—as yet.

When Cheyne was invited by Cheshire to search for the causal organism of brood disease, he started off with a clear idea of the problem. In 1883 Koch had formulated his four postulates or conditions which must be fulfilled before one can assert that a certain microbe is the cause of a particular disease. Briefly they are as follows: (1) the organism must be constantly present in the body of the diseased animal. (2) it must be possible to "grow" the microbe for several generations on some nutrient medium, until it is reached a "pure culture," free from other bacteria and from the tissues of the diseased animal. (3) this pure culture when introduced into the body of a healthy animal must produce the disease, and (4) the microbe must be recoverable from the body of the animal thus artificially infected. Koch held that the proof was not complete unless all four conditions were satisfied.

Cheshire supplied to Cheyne a piece of comb and indicated certain sealed cells believed to contain diseased larvæ. The cappings were brushed over with disinfectant to destroy any external bacilli and the cells then opened with sterilized forceps. The larvæ were found dead, yellowish in color, and almost liquid. From these dead grubs Cheyne inoculated various sterilized nutrient media, and studied the bacilli which developed. One form, constantly present, was identified as new to science, and was named *Bacillus alvei* (*Bacillus of the hive*). This was grown for several generations outside the body of the bee grub and a pure culture was obtained. It was found that *B. alvei* multiplied freely in milk at blood heat, and it was a pure culture in milk which Cheyne supplied to Cheshire for the third test, inoculation of healthy brood.

Cheshire took some healthy brood and covered the face of the comb with paper in which he had made lozenge-shaped openings. He sprayed the comb so protected with the pure culture of *B. alvei*. The larvæ protected by the paper remained healthy, some of the unprotected larvæ were removed by the bees, but all those that remained took brood disease. From these artificially infected larvæ the bacillus was easily recovered. The four conditions of Koch had been satisfied and the collaborators felt justified in declaring that *B. alvei* was the true cause of the brood disease under study.

This conclusion was not seriously challenged till 1912, when Dr. G. F. White published a paper on "The Cause of European Foulbrood." During the 27 years that had elapsed,

A PIONEER IN BEE DISEASE RESEARCH

By John Anderson.

IN 1885 was published in the *Journal of the Royal Microscopical Society of London* a paper which seems to have been the first bacteriological publication on bee disease which had appeared up to that time. It was by Frank R. Cheshire and W. Watson Cheyne, and dealt with a new bacillus called by the discoverers *Bacillus alvei*. Cheshire is well known to readers of bee literature, and there is hardly any work on the natural history of the bee which makes no mention of Cheshire, perhaps the greatest student of the bee that Britain has produced. But who was this W. Watson Cheyne, and whither went he after producing work on bee disease which was unassailed for nearly 30 years? The answer is that Cheyne was not a beekeeper and he was called to other and more important work. But he is still with us, full of years and honor, and at last he has leisure to become a beekeeper and to resume his study of bee disease commenced more than 40 years ago.

William Watson Cheyne was born in 1852 in the Shetlands, a group of islands situated at the extreme north of Scotland, about 300 miles from Aberdeen. It is rather interesting that the earliest bacteriologist to study bee disease should have been born in the only county in Scotland that has no bees. About 1870 Cheyne was a student at Aberdeen University, where, half a century later, P. Bruce White was to discover the bee mite, *Acarapis woodi*, but the future surgeon took his medical course at Edinburgh University.

During the last half of the nineteenth century the new science of bacteriology had an extraordinary vogue. The discoveries of Pasteur had such a profound influence that almost every clever doctor of the period turned his attention either to surgery or bacteriology, and Cheyne was eminent in both. It was in 1884, when he was still but a youth, that he became associated with Cheshire in the research into brood disease in the honeybee. Later, in 1888, the rising young surgeon became Hunterian Professor in the Royal College of Surgeons in London. He was consulting surgeon to the British Army during the war in South Africa, and as a recognition of his eminence and his

services to the nation he was made a baronet in 1908. For the information of American readers it may be explained that a baronet and a knight are both addressed as "Sir," but there is a difference. The title of the knight dies with him, but a baronetcy is hereditary, and the descendants of Sir Watson Cheyne will be baronets as long as there is a son to inherit.

In the Great European War, Sir Watson Cheyne was again in uni-



Sir William Watson Cheyne, a pioneer investigator of bee diseases.

form as Surgeon-General to the British Navy; and at its conclusion he became parliamentary representative for the Scottish Universities. He resigned his seat in parliament when he gave up his London practice, and retired to his estate in Fetlar, one of the most northern islands of the Shetland Archipelago. He is very popular in his native Shetlands, where he still performs delicate surgical operations in the little local infirmary. This is a labor of love and shows not only that his hand has not lost its cunning, but shows also the goodness of his heart. The King has made him

the bacteriology of bee diseases had made remarkable progress, and it is not surprising that the careful work of White, carried out under the best conditions, with instruments and processes of a precision unattainable in 1884, should give results different from those obtained at the earlier date. By this time six different organisms had been found by various workers in grubs suffering from the disease now called European foulbrood. One of the six was *Bacillus alvei* and another was a new form discovered by White in 1907, and called by him *Bacillus pluton*.

By feeding an emulsion of diseased larvae to healthy grubs, White was able to produce the disease, but when this emulsion was passed through the pores of a Berkefeld filter it was rendered non-infective. These two experiments indicated that the disease was due to some organism, one that was too large to pass through the filter, big enough, therefore, to be visible under the microscope. White concluded that it must be one of the six already mentioned. He was able to grow five of them outside the grub and to produce pure cultures of each, but these pure cultures did not produce the disease. Since one of these cultures was that of *Bacillus alvei*, we note that here the work of White was in sharp conflict with that of Cheshire and Cheyne, who claimed a pure culture of *B. alvei* did produce the disease when fed to healthy grubs. White noted further that, although *B. alvei* was very evident in the advanced stage of the disease, this particular organism was either absent or present in small numbers in the earlier stages.

By a process of elimination, White thus arrived at the conclusion that the only remaining visible organism, *Bacillus pluton*, must be the cause of European foulbrood. Unfortunately, he was unable to prepare a culture medium on which *B. pluton* would grow, so he could not produce a pure culture of this organism. His conclusion, therefore, is based on evidence which satisfies only one of the postulates of Koch, and we cannot yet regard the question as closed.

About a year ago Sir Watson Cheyne decided to become a beekeeper and to introduce bees into the Shetland Isles. One evening he procured a little 20-page booklet on the handling of bees, studied it overnight, and next day he could have passed a practical examination in the handling of bees. It was a dull day with a cold Aberdeen east wind, but I got a few snapshots of this beginner of 71 practicing the handling of bees. The Baronet is now in South America, but he is coming home soon, and we hope that he will resume the research into brood disease, at which he made such a promising beginning some forty years ago.

North Scotland College of Agriculture.

"THOSE EARLY BEES"

By T. H. Frison.

In the January, 1924, number of the American Bee Journal there appeared a short note by Mr. Frank C. Pellett relating to the subject of whether the honeybee occurred in America prior to its discovery by Columbus. In the article just referred to, Mr. Pellett gives a quotation from Swammerdam, written about 1669, concerning the production of a "kind of rock honey in some parts of America" by a peculiar kind of bee.

The description quoted by Pellett and originally written by Swammerdam may easily be accepted, without a stretch of imagination, as applying to the nesting habits and the peculiarities of certain of our North American species of bumblebees. Swammerdam says that "this bee makes no regular comb," and here we have the first evidence in support of my contention, because bumblebees do not make a regular comb, in contrast with the comparatively regular comb of the honeybees. What Swammerdam says in regard to the bees storing honey in "waxen vessels" applies very well to the habits of the American bumblebees. Honey is stored by this native genus of bees in especially constructed waxen cells (really a composition of wax and pollen), and also in cocoons from which the adults have emerged. The quantity of the honey thus stored might readily be stated to occur "in large quantity." Swammerdam, according to Pellett, mentions that "forty of these cases will sometimes hang together," and this description often appropriately applies to the number of cells found to contain honey in the nests of many species of bumblebees. Except for the bumblebees, I know of no other native North American bees found north of Mexico which store honey in the quantity mentioned and in the manner described by Swammerdam.

Other statements are contained in the quotation from Swammerdam by Pellett which also point to the fact that the statements of the original author refer to bumblebees. For instance, "the cells or cases are larger than the biggest grapes, and of an oval shape; each has at first an aperture at the upper part, in which the bees put the honey; when it is full they close this aperture." This description of the cells applies perfectly to the oval-shaped, grape-like cocoons which are used by many bumblebees for the storage of honey. The aperture referred to is undoubtedly the opening made when the adult bee leaves the cocoon and this hole is almost always made in the upper portion of the cocoon. Cocoons from which the adults have emerged are often renovated by the bumblebees and honey placed in them. Then, when they become full of honey, or partially so, they are sealed over with a composition of wax and pollen. In addition to the utilization of old

cocoons most species of bumblebees store honey in especially constructed wax-pollen cells. The queens, however, when starting a nest in spring are always forced by the absence of cocoons to construct such a wax-pollen cell, called the honey-pot, for the storage of their surplus food supply.

Swammerdam's reference to the honey cases being found in connection with rocks, again suggests that the insects that he was talking about were bumblebees. Queen bumblebees start their nests wherever they can find a sheltered situation, and rock piles often provide them with ideal places for nidification. I have several times found nests of bumblebees in rock piles, and one species which is common in the states along the northern Atlantic seacoast frequently nests in such a place. Of particular importance to my contention is the fact that the cocoons and larval cells of this and many other species of bumblebees are frequently "larger than the biggest grapes, and of an oval shape." The comb of a nest of bumblebees started between stones in a rock pile frequently becomes enlarged by its natural development to such a size that many of the cells come into direct contact with the adjacent surfaces of the rocks, in fact may even become partially fastened to them; thus, undoubtedly, the peculiar expression of "rock honey."

The reader will readily perceive from what I have written that Swammerdam's statements apply very well indeed to the ways of certain native bumblebees and as Pellett says, "the wildest stretch of imagination could hardly credit these clusters of cells larger than the biggest bunches of grapes to the honeybee." Therefore, references of the character of Swammerdam to honey-producing bees must be weighed with great care by one trying to trace the history of the honeybee in North America. The descriptions of older writers of insect life are often of such a general nature that many kinds of insects may frequently have been the inspiration for their production. In the present instance, if, as seems highly probable, this bit of Swammerdam's writing refers to a species or genus of bee which is native to America, north of Mexico, particularly of a species inhabiting the eastern states (a section of the country familiar to Europeans in Swammerdam's time) the bumblebee was undoubtedly the object of his remarks and not the honeybee.

Illinois.

Marseille International Congress

Beekeepers desiring a copy of the report of the Marseille International Congress of 1922 may obtain it by remitting 10 francs to the Society of Bouches-du-Rhone, 7 Rue Buffon, Marseille, France. The report may be also secured from C. Vaillancourt, Department of Agriculture, Quebec, Canada.

THE WEATHER AND HONEY PRODUCTION

By John H. Lovell.

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FEW farmers realize that very slight differences in the weather may determine the success or failure of their crops. According to the Year Book of the Department of Agriculture for 1920: "An extra quarter of an inch of rain may add thousands of bushels to the corn planter's harvest; a few degrees lower temperature may put a lot of extra money into the potato-grower's pocket. The way the wind blows is sometimes more important than the cost of farm labor." An examination of the reports of the Bureau of Crop Estimates shows that the surplus of honey is dependent to an astonishing extent on the weather. A honey plant which is well adapted to the weather in one section may be nectarless in another locality. Bitterweed is a good honey plant in the Southern states, but in my garden the bees gave it no attention. Under the term "weather" may be included moisture and dryness; heat and cold; wind and calm. It is often as important to consider their distribution throughout the year as the annual amount. The sooner we know the weather conditions under which each honey plant will give the best results, the better it will be for bee culture.

Rainfall and the Production of Honey

The effect of rain on the production of honey is threefold, according as it influences the growth of the plants, the development of the flowers, and the secretion of nectar. It is evident to everyone that rainfall largely determines the growth and distribution of plants. In the eastern and southeastern states, where the annual rainfall is usually heavy, there is a varied and abundant honey flora and a great number of colonies of bees. Yet in this region dry weather in the fall and spring may cut short the surplus from white clover. For example, according to the observations of Virgil Weaver, at Valley View, in central Kentucky, where the soils are light, rainfall during a series of years exerted a very marked influence on the growth of white clover. The year 1902 was very wet, and in 1903 there were 100 pounds of honey per colony. The fall of 1903 was very dry, and there was no honey in 1904. The year 1904 was also dry, and the honey crop in 1905 was also a failure. In 1905 and 1906 the rainfall was normal, and there were good crops of honey in 1906 and 1907. The fall of 1907 was the driest in 37 years, and in 1908 only a meager surplus was stored. But a heavy rainfall may be counterbalanced by other factors. In the Gulf states, over a large area the soil is too acid for white clover, and in localities where it thrives the tem-

perature is so high that it yields little nectar.

The effect of rainfall on the growth of honey plants is more easily observed in arid and semi-arid regions. As the result of the light rainfall bee culture over the Western states is largely dependent on cultivated plants grown under irrigation, which are usually reliable. But the wild honey plants are very erratic yielders. The mountain sages of Southern California often fail to yield a good crop, on account of drought, but in 1884, one of the wet-



Bitterweed yields nectar freely during dry weather in the South, but was of no value in cold and wet summer in Maine.

test years known in the county of San Diego, there was a rainfall of over 27 inches, and in various parts of the county 60 inches fell; and a surplus of 500 to 700 pounds of honey per colony was quite common. In southern Texas, in the Rio Grande Plain, in 1917 and 1918, the honey plants suffered so severely from drought that not far from 50 per cent of the colonies of bees perished. In this region plant growth responds very quickly to rainfall, thus the palo verde, or green-barked acacia, a desert tree, puts forth leaves in early spring but drops them in the dry weather following; but if there are late rains it puts forth foliage a second time. A much greater number of examples might easily be given, but from the above it is clear that one of the first requirements of a good honey crop is a good growth of the plant. Stunted plants yield much less nectar than those which are well developed. Vigorous plants of buckwheat yield about twice as much nectar as weak ones. Kenoyer found

that plants which had been allowed to dry to the wilting point several times in the course of their growth, yielded a little less than one-third as much nectar as normal plants.

But the time of the rainfall may be as important to the success of agricultural operations as the amount. A very remarkable illustration of this statement was offered by the condition of the Indians in Utah and New Mexico at the time of their discovery. Two kindred races of Indians, the Utes and the Pueblos, lived the former in Utah and the latter in New Mexico. The Utes were a savage race, almost the lowest of American Indians. They found it difficult to obtain sufficient food to sustain life, and ate lizards, grasshoppers, rabbits and acorns. They had no permanent home, but wandered from place to place, maintaining a bare existence. The Pueblo Indians, on the contrary, had made a great advance both in their social relations and their form of government. They produced an abundance of corn, squashes and beans, and kept large flocks of sheep and goats. The tribe numbered many thousands and was among the most progressive of American Indians.

Why were these two tribes so unlike? Both Utah and New Mexico are semi-arid regions with an average rainfall of about 15 inches; but at Santa Fe, in June, July and August, the average rainfall is 8.4 inches, whereas at Salt Lake City, in the same months, it is only 2.2 inches. The summer rains, says Dr. Huntington, enabled the Pueblos to develop a system of agriculture, to which their numbers and prosperity were due. The Utes remained savages because the summer rains were not sufficient for the growth of crops.

Rainfall and the Development of Honey Plant Flowers

It is obvious that there must be sufficient moisture in the soil for the normal growth of plants, and that the beekeeper should carefully consider this factor before selecting a location. But it is less widely known that the development of the flowers of many plants is very closely connected with a preceding rain. This is well illustrated by the thorny chaparral of southern Texas, which consists of 70 to 80 species of small shrubs and trees. In this semi-arid region, a rain at any time during the summer will cause a number of honey plants to bloom in a few days. The yellow rain-lily is the first to respond, blooming in about 60 hours after rain (not valuable for nectar). White brush (*Aloysia ligustrina*) follows in about five days, and it is of interest to note that the flowers are

reported to yield more nectar during the rain-induced period of bloom than during the regular blooming time in spring. Beside white brush, soap bush (*Guaiacum angustifolium*), coma (*Bumelia lycioides*), Brazilwood (*Condalia obovata*) and mesquite, bloom twice or more times in a single season if there are rains. Mr. Pellett, in his valuable articles on Texas, has given many details in regard to this peculiar flora from personal observation. In Australia, flatweed (*Hypochaeris radicata*), a plant resembling the dandelion, sends up flowers at all times of the year, after showers, following a period of dry weather.

But too much rain may induce a rank vegetative growth which is detrimental to the development of flowers. Much rain will prevent the blooming of mesquite a second time. Several years ago mesquite in Texas twice started "to tag" and heavy rains prevented the buds from maturing. In 1921, in Arizona, according to Vorhies, after an unusually dry winter, there was a fair flow from mesquite. But in July and August the rainfall was exceptionally large, the precipitation at Tucson being 6.2 inches in July alone. A second blooming was expected, but the super-abundant moisture induced a heavy vegetative growth and the trees scarcely blossomed at all a second time. All northern fruit-growers understand that rapidly growing trees are not likely to bloom. But there are several honey plants which will bloom despite a severe drought. In southern California, in the fall, when the landscape is brown and sere, when the shriveled mountain sages are masses of gray and black, the dry stubble fields are covered with the small, white flowers of the drouth-weed and the green and purple bloom of blue curls. Both yield a fair amount of nectar.

Rainfall and the Secretion of Nectar

This is a somewhat more difficult phase of our subject than those previously considered. In order that a nectary may secrete nectar, its cells must be distended with water, or a solution of water and sugar. The nectar must exert a strong pressure outward, distending the elastic wall of the cells. If, owing to dry weather, there is not sufficient moisture in the soil, the leaves and young stems of plants will wilt or droop. They are rigid only when the cells composing them are distended or swollen with water, or turgid, as it is termed by botanists. As has been pointed out by Sachs, the nectaries of plants secrete nectar only when the parts concerned are turgid. If the cells are flaccid no nectar is secreted. Since growth takes place only when the plant cells are turgid, flaccid cells are largely inactive. The advent of dry weather has often cut short the honey flow. Plants with leaves and flowers drooping for want of moisture will not yield nectar. The turgor pressure in nectar cells may

amount to about five atmospheres. Secretion in all probability begins by the forcing of the nectar through the outer wall or membrane of the nectary. The walls of nectary cells are relatively thin and easily permeable. As soon as the nectar has reached the external surface it evaporates and forms a solution more dense than that within the cells of the nectary, and in consequence more nectar is drawn outward by osmosis. But during secretion turgor pressure manifests itself whenever the inflow of water exceeds in quantity the outflow of nectar. It is a widely-held opinion that internal pressure is an important factor in beginning nectar secretion.

Numerous instances have been recorded where a heavy shower at night has turned a failure into a success or has stimulated the honey flow on the day following, especially in the case of white clover. According to the A B C of Bee Culture, a forest of logwood in Jamaica may at times be beaded with unopened blossoms drooping heavily downward. In the evening everything looked hopeless for want of moisture, but rain fell during the night, and thousands of acres burst into bloom in the morning and yielded nectar abundantly. In open wheelshaped flowers, like those of buckwheat, the nectar may be largely washed away by rain, as has been proven by the use of an artificial spray.

Fog

"The wool-shod, formless terror of the sea."—Markham.

Fogs are most common near oceanic coasts. Dense fogs prevail off the coast of Newfoundland, and on the coast of Peru there is fog for nearly half the year, especially in the evening and morning. On the Atlantic coast of the United States fogs

are not common enough to noticeably affect the honey flora. But fog is an important factor in the production of honey on a strip of land in California extending from Santa Barbara County to San Diego County, about 20 miles in width, where it prevails during May, June and July. In this area Lima bean is a valuable honey plant, of which, in 1920, it was estimated, there were about 150,000 acres under cultivation. Too much sunshine will cause the plants to droop and check the flow of nectar, and the best results are obtained in the fog area.

Humidity

Humidity is the quantity of water vapor in the air. On a rainy day the air is saturated with moisture and the humidity is 100 per cent; on a dry day it is about 50 per cent. In the semi-arid region of Nevada, where the average rainfall is about 10.6 inches, the average annual humidity is 51 per cent. In Iowa, where the average annual rainfall is 30.9, the average annual humidity is 76 per cent. Honey stored in a humid atmosphere contains more water than that gathered in a dry air. Analyses of honeys from Wisconsin showed an average moisture content of 3.79 per cent greater than was found in honeys from Nevada. Less water evaporates in the humid air than in the dry air. Nectaries secrete a larger quantity of water in a humid air because the evaporation of water from the leaves is checked and accumulates in the plant cells under greater pressure than when there is little moisture in the air. In a saturated air, water may escape also in drops from the ends and teeth of the leaves. But while the amount of water passing through the nectaries increases, the quantity of sugar secreted remains about the same.



Snow-on-the-mountain has been reported to yield a surplus, but in the author's garden in Maine some of the extra-floral nectaries were nectarless, while others showed only a trace of nectar.

Scholl states that cotton in Texas yields nectar most abundantly in early morning, but that the quantity decreases as the air becomes dryer at mid-day. Toward evening it again increases unless the air is very hot and dry. During cloudy days the yield is good throughout the day. Moist air, says Sladen, with slow evaporation, seems to be necessary for a good gathering from heather in England. Buckwheat flowers secrete much more liquid when placed under a bell jar than in the open air.

Temperature and Honey Production

Temperature exerts a greater influence on the functions of flowers, including nectar secretion, than does light, humidity or rainfall. According to recent investigations in France, the movements of the parts of flowers, their opening and closing, are caused by the daily rise and fall of temperature. During a partial eclipse of the sun there was a fall of ten degrees, and flowers ceased to open their corollas. The temperature at which nectar secretion begins and at which the largest amount of nectar is secreted varies greatly with different honey plants. In general, high temperature favors nectar secretion, since the membranes of the nectary is rendered more permeable, the solvent power of water is increased and chemical changes in the plant take place more readily. Records of honey production for 29 years, at Clarinda, Iowa, showed that the largest yield from white clover was on days with a temperature from 80 to 90 degrees F. According to the reports of 19 large honey producers in Iowa, Missouri and Illinois, the largest yields of nectar are obtained when the temperature ranges from 80 to 100 degrees. Alfalfa yields nectar most freely when there is ample moisture in the soil of irrigated land,

during a succession of hot days. Nectar secretion in tropical plants necessarily takes place at high temperatures. On the other hand, very high temperatures exceeding 95 or 100 degrees may be injurious.

Several very important honey plants yield nectar abundantly at moderate, or in some instances relatively low temperatures. Willow-herb will yield nectar freely during weather that would stop all storing from basswood and clover. "I have seen," says Hutchinson, "bees working on raspberry when the weather was so cool that white clover would not yield a drop of nectar." Sainfoin in England will yield between 60 and 65 degrees, even with very little sunshine. Sladen records that on a September day, in England, bees brought in from heather most honey between 8 a. m., when the temperature was only 48 degrees, and 10 a. m., when it was 52 degrees. I have also a report from British Columbia of bees working on flowers when the temperature did not rise above 52 degrees all day.

Change of Temperature Favors Nectar Secretion

The statement has frequently been made that sugar accumulates in plants at a low temperature, and that cold nights followed by warm days are better for nectar secretion than a uniform temperature. This statement taken alone is likely to prove misleading. Sugar is formed most rapidly at a high temperature. On a warm, clear day sugar is made in the cells of leaves more rapidly than it can be carried away, and in the form of starch it is stored in the granules (chloroplasts) containing the leaf green pigment. During the night it is moved out of the leaves. The best or optimum temperature for the manufacture of sugar by leaves, in

many plants, is between 68 degrees F. and 72 degrees F.; but it may be made slowly in some cases at much higher and lower temperatures. Plants cannot make sugar in the night time because sunlight, the force which drives the machinery of the leaf, has been turned off when the sun dropped below the horizon.

But growth may take place in darkness as well as in the light. The best temperature for growth with most plants is between 77 degrees F. and 90 degrees F., for there is an optimum temperature for growth as well as for the making of sugar and starch. But it will be noted that a higher temperature is required for growth than for the manufacture of sugar. In the Temperate Zone the temperature at night is usually much lower than in the daytime, and in spring often falls nearly to or even below the freezing point. At night, then, growth is checked or stopped, and the starch formed during the day remains unused until, with the return of day, the temperature again rises. As starch is again turned back into sugar before it is assimilated by the plant, there will clearly be more sugar available after a cold night than after a warm night, during which much or all of the starch has been used in growth. In general the activities of the plant at night are less than in daytime, as is shown by the so-called sleep of plants.

Carbohydrates, such as the starches and sugars, are made in green leaves by the use of the sun's energy. They travel out of the leaf chiefly in the form of glucose or grape sugar (dextrose), and are carried to different parts of the plant, where they are used or stored. Wherever the cell sap penetrates, it probably contains glucose, which may be stored in plant cells as glucose, or be converted into cane sugar, starch, or oil. High temperatures favor the formation of starch and lower temperatures the accumulation of sugar. After two days' treatment white clover leaves were found to contain 30 per cent more sugar at 50 degrees F. than at 77 degrees F. As a temperature of 50 degrees F. is far below the best or optimum temperature for growth, while 77 degrees is a favorable temperature, a greater amount of sugar would naturally be expected to be present at the lower temperature. That a lower temperature, however, favors the conversion of starch into sugar is shown by the fact that woody shrubs and trees contain the largest amount of starch in the fall, which during the winter is changed into sugar found in the bark and winter leaves. A rise of temperature in the spring causes the sugar to change back again into starch. The conversion of insoluble starch into soluble sugar is effected by the agency of ferments known as enzymes. As enzymes work best at high temperatures, from 68 to 100 degrees, it would seem as though this change could not take place at very low temperatures.



Buckwheat in New York is an excellent honey plant but in southern Maine and in the Central west it yields little nectar.

The Effect of a Sudden Fall in Temperature

A cold rain, with a sudden drop in temperature, has often been reported to bring the honey flow to an abrupt close. Alexander relates that a shower at night and a drop of 11 degrees in the temperature, on the 24th of August, brought a most excellent harvest from buckwheat to a sudden close. At Center Junction, Iowa, in 1920, early in September, bees were bringing in a great amount of honey from heartsease; but on the 8th day a hard rain and drop in temperature ended the flow and started the bees at robbing. Much interest has been expressed by beekeepers as to the cause of this sudden end of the honey flow. A drop of ten or more degrees checks the conversion of starch into sugar, and renders the outer membrane of the nectary less permeable. If the nectar is unprotected it may be washed away, and no longer be drawn outward by osmosis. The purpose of nectar is to allure insects to the flower, and normally secretion stops as soon as pollination takes place although there are exceptions. After a period of active secretion, the living substance in the nectary cells (the protoplast) has decreased in quantity and is partially exhausted. Thus it may not be able to recover from a severe check in its functions. A drop in temperature, however, does not always bring the flow to an end. In Florida a slight frost was observed to reduce the flow from orange bloom for three days, but later the yield became larger.

The Wind

"The wind has moods and a many-sided character; indeed there is no human emotion, no virtue and no vice of the human soul, that does not find its representation or its symbol in the blowing of the wind."

On the Great Plains, where there are few trees and the land is level or rolling, violent winds may greatly retard the flight of bees. A beekeeper of this section writes to me that they have winds strong enough to blow bees off the face of the earth. From September to March this region is also subject to "northers," or severe northerly winds which are cold and dry. The temperature may fall in a few hours from 50 to 60 degrees, and the low temperature and violent wind are exceedingly injurious.

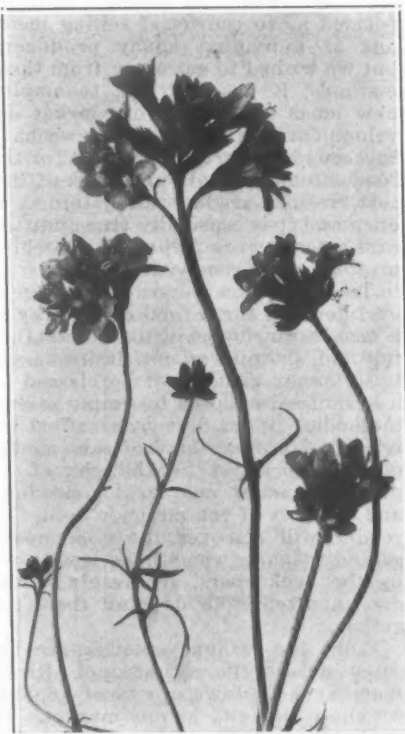
In the southwestern section of the United States a hot, dry wind may greatly injure the honey crop by causing the leaves to droop and the flowers to wilt. It will be remembered that neither growth nor nectar secretion can occur unless the plant cells are swollen with water. There have been instances in California where, at the beginning of the honey flow from orange trees, a desert wind has caused the flowers to turn brown and fall to the ground.

But at Clarinda, Iowa, the records of weather conditions and honey pro-

duction, during 29 years, showed that the direction of the wind was of little importance. From Kenoyer's analysis of the figures, a slight advantage was indicated for south winds due to warmer and clearer weather, which usually accompanied them; while east winds were a slight disadvantage, as they brought clouds and rain.

Finally, wind may determine the character of the soil. In the Mississippi Valley there are more than 20,000 square miles of fine, silty soil, known as loess, which it is believed, was deposited by the wind in comparatively recent times.

Maine.



Purple gilia a valuable western plant, also does well in the author's garden.

THE RELATION OF SUGAR TO THE HONEY MARKET

By Edward G. Brown.

The relation of sugar and honey in the baking business is not generally understood and an explanation as given by the head of a large biscuit company may help some.

Honey can be substituted for sugar in some places, but not in all, as honey imparts a particular flavor and, if used in all places, all cookies would have a degree of similarity in taste.

Invert sugar can be substituted perfectly for honey in general results with a small amount of honey to give the desired flavor and comply with the law, so that the name honey can be used in connection with the finished article.

With these two statements we have on the present market, in Sioux City, on the basis of New York:

New York sugar at per cwt.	\$8.25
Freight	.25
Cost of inverting	1.00

\$9.50

This means that on this base the baker can, if necessary, pay as high as 10c for honey, but western sugar can be laid down at about 1c less, or on a basis of 9c on bake honey. (While the Sioux City price on New York base is 10c, the New York price would be only 9c.)

Under these conditions sugar becomes a substitute for honey when the delivered price of honey in Sioux City becomes higher than 9c.

Now for the purpose of illustration, we will let a column ten inches high equal the average honey crop, with the bakers and manufacturers using the darker and inferior grades from the bottom up and the table grades using from the top down.

If the price of sugar is low, the bakers will not climb the column as high as if the price is high, and consequently a greater proportion of the crop is thrown onto the table market than with a high sugar price.

With a short honey crop, the two consuming classes meet and we have the entire crop consumed; with a large crop, the amount of the column that is surplus is much greater.

There is a lot of honey produced that is fit only for baking and manufacturing purposes and the beekeepers should be taught to recognize this and market their output according to what it is fitted for.

Bakery grades should be marketed on the basis governed by the price of sugar or the supply of this grade.

There is a growing demand for good table honey and the greatest bear on the market is the forcing of low grade or poorly prepared honey on the public, in place of what they want.

The head of a large chain store says that you can sell most anything to the jobber and he will manage to unload it on the retailer, but the consumer may balk when the retailer tries to unload it on him.

If the retailer's shelves are full of inferior grade or granulated honey, which the consumer refuses to buy, he will not buy more until this is cleaned up and a few pounds, under this condition, can block the sale of many pounds of properly graded and prepared honey.

A German Queen-Rearing Book Revised

The fourth edition of "Die Koenigen," by Wilhelm Wankler, is in our hands. It is a 120-page, paper-bound book which gives in considerable detail the method of producing queens which Mr. Wankler uses.

The publisher of this volume is Theodor Fisher, Freiburg im Breisgau, Kirchstrasse 31, Germany, and the price of the book is 90 cents, according to statement of this firm.

THE DEVELOPMENT OF THE LOCAL HONEY MARKET

No. 1—Our Marketing Plan and the Reasons for it

By G. H. Cale.

THE merchandising of honey in volume has relatively few points of contact with production. It is a field by itself, with peculiar and special problems. To determine some of the principles involved in selling honey and to experience the difficulties to be overcome, the American Bee Journal, during the fall of 1923, mapped out and carried on a direct marketing campaign with a large crop of honey, the results of which, we believe, will be of considerable value to our readers. The present article is the first of a series giving the general results of this work.

The publishers of the Journal have been large beekeepers for a long time and have produced and marketed large honey crops, mostly through local means and through a mail order trade which has developed over a period of years. The lines of selling previously followed gave results through trial and error, without any definite attempt to develop or bring into co-operation all the avenues of sale to be found in a local market.

Crops have been sold, therefore, largely through a persistence of undirected effort and the fine support of a good reputation, with no definite analysis of the market and its possibilities. Most beekeepers who have been likewise successful in selling will find that their efforts have been similarly made and they will also admit that there are possibilities in their market which they have never had the time or the knowledge to use. They have not broken into all the lines of trade which might handle their honey to a greater advantage.

An Outline of the Plan

In this campaign, our plan was not only to develop the local market in our own interests but, at the same time, to gain a clearer knowledge of how established marketing methods might be applied in the honey industry. We were, of course, fully informed as to the usual selling methods of individual honey producers, but we wished to get away from these methods, if possible, and to employ new ideas and means of market development. Whether or not we have succeeded, in part, is a matter for the reader to decide. In any work of this sort, results are not all obtained at once and it is especially true that the first attempts are full of errors which may later be removed.

To build up a persistent and general demand for a food commodity is a task requiring skillful understanding and, in spite of our desire to see it so, honey cannot yet be classed as a basic food adapted to simple selling methods. In our first year's effort we tried to use every kind of sales methods which might be thought of as practical under our local conditions and, in most of the methods used, the reader will discover the commonest selling schemes which have been used by the beekeepers, separately, without an attempt to dovetail them together.

Since the Dadant apiaries are located across the Mississippi River from Keokuk, Iowa, a city of 16,000, we chose this city as our market. It cannot be called a new market for honey, since not only the Dadants,

but other beekeepers have sold honey in it for fifty years. As we found out in our work, it is a honey-wise population, as most folks know what honey is and have definitely decided that they like it or do not like it. The same sales methods in a new market might be productive of greater results than we were able to obtain.

In order to conflict the least with those beekeepers usually selling their honey in the city we purposely delayed the beginning of our work until the week before Thanksgiving and we found, on starting, that at least two beekeepers had previously sold all the honey they could throughout the city to both the stores and to the individual consumer. It might, then, have been called a saturated market, and it looked as though all the odds were set decidedly against us.

Our plan, in general, was to reach every possible consumer of honey, individually; have them see, taste, and learn the uses of the product which we had to offer and then supply them through the regular grocery trade, maintaining the demand by a carefully planned advertising and follow-up campaign.

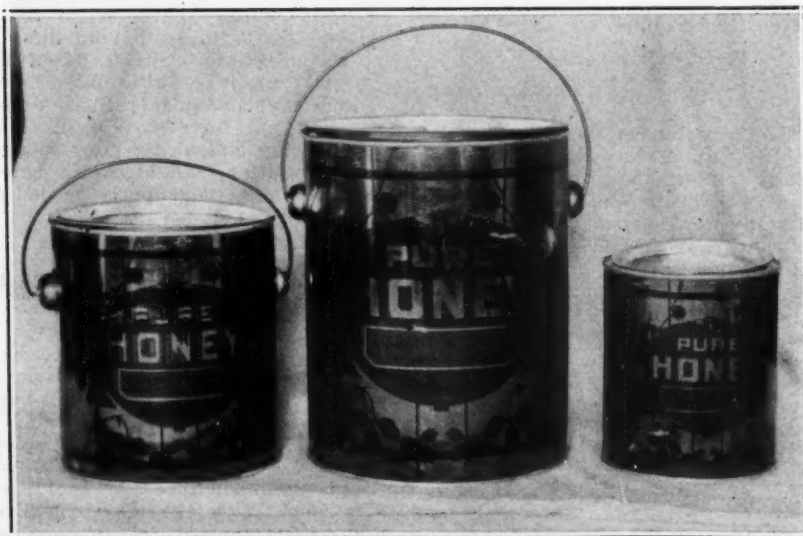
The Salesmanship Used

Ordinary selling embraces only the simple exchange of merchandise for an equivalent. This type of selling is plentiful. Correct salesmanship, however, goes much farther than this and requires continual study of the surroundings and conditions governing the sales to find how the sales may be constantly duplicated and increased.

It was under the assumption of studied salesmanship that we tried to carry on our work. We used four salesmen constantly until we began to approach the dealers, when we reduced the number to two. Before starting we determined our methods of approach, our sales talk, and our division of territory. All of us were together as much as possible through the work so we might exchange opinions, and experiences, and make changes in our methods, which resulted in building up an efficient and well-organized system.

The Sales Methods

We chose a direct canvass as the surest method of reaching the majority of the prospective individual consumers. We could see little hope in attempting to sell honey through the grocer and relying on impersonal methods to reach the consumer. Neither would it have been of much use for us to have attempted to market through the grocers, since, after starting our work, we found that they had been fully supplied with honey by other beekeepers. In fact, the majority of them, if asked, would have considered that they had all the honey they would need until the next year. The very fact that the market was saturated left us no recourse but to approach the consumer directly



The lithograph pail, chosen for its display and advertising value, was carefully designed and was reproduced in the advertising.

with some new and unusual method of contact.

On the other hand, to sell directly to the consumer would have left us without the support of the regular grocery trade which we must rely on in any permanent attempt to keep our product persistently before the consuming public. Honey is not a seasonal product, it has bitter competition, and, once allowed to disappear from the grocer's shelves, it drops from the consumer's attention.

To force the co-operation of the dealer, therefore, our canvass was based on grocery orders and not on direct sales. The canvassers merely took orders for the honey, just as the grocery clerk would do, for future delivery, and, when the city had been thoroughly covered, the grocers were faced with a volume of orders which compelled them to sell our honey, even though they were already supplied with the honey of other producers. Our discount to the grocer was the usual 20 per cent on the selling price, or 25 per cent of the price which he paid us. This is the conventional minimum margin at which grocers figure they can afford to handle goods.

From the above, it may seem that such a method might have resulted in much hard feeling on the part of the grocers, but we so handled it, as will later be described, that it left the grocer not only feeling well disposed towards us, but leaving the most of them thoroughly committed to our sales methods and to our product.

Advertising

We tried to build our advertising appeal on the motives of hunger, health and enjoyment. It takes a change of habit, a certain amount of inconvenience, to get housewives to persist in the use of honey over other sweets which are cheap and readily available. Our advertising copy tried to show the reasons why people should use and buy honey constantly. It appealed to the appetite for something sweet, to the desire for a healthful sweet, to the advantages in the use of honey as compared with other sweets.

The advertising contained a constant and familiar figure through all of it. We used a characteristic picture arousing the sense of humor and a certain amount of appetite for honey, as shown in the illustration. The advertising was carried in the newspapers, placed in the grocery stores on shelves and windows, posted in various conspicuous public places, wrapped in the grocery deliveries, stuffed in mail boxes. It is doubtful if any family in the city was not bombarded once or twice with our appeal. With all this effort, if we failed anywhere, it was in not keeping up the pressure long enough.

We believe that an advertising campaign of this sort, with no other effort, if followed from year to year

HONEY, dat's all!



This humorous figure appeared all through the advertising. In the stores, on cards, it was red and black, both colors attracting the eye well. In newspaper and smaller advertising it was solid black. The appeal is evident.

and month to month, will do much to move a good volume of honey. There is no escaping a newspaper campaign of advertising with the proper dealer aid to go with it. That is why the newspaper carries the bulk of all advertising. It is the one sure means of obtaining immediate distribution and of enlisting the storekeeper's support. It furnishes a daily contact with the majority of consumers. Its very prominence and insistence compels consideration. You may not read the first one or two of a series of advertisements but the campaign will get you finally. This has been proven over and over again.

Securing the Co-operation of the Dealers

In view of the supply already on hand in most of the stores, we thought that it would be difficult to secure the full co-operation of dealers. It did not prove to be so, however, since we faced them with bona fide orders, the offer of their usual margins of profit, and showed them that we had already entered on an advertising plan which would react to their benefit immediately. They ordered more honey than we had anticipated, in almost every case, as well as taking and delivering what we had sold among their customers.

Most dealers would perhaps be suspicious if we had been strangers to them, but we were well known to most of them and they therefore felt a confidence in us which was of great value all through the campaign. Wherever possible we obtained space in the store windows for displays and furnished the grocers with signs and placards, reading matter, and order stuffers with which to appeal to their trade.

At the date of this writing, May 7, we are still receiving orders from the grocers for honey, in spite of the fact that most of them have heretofore considered the business over "for the season" at this time of year.

Conclusion

In the articles to follow it is our purpose to outline the more important details of these efforts, especially those relating to the city canvass, selling to the dealers, displays and advertising, in such a way that worthwhile suggestions may be obtained by our readers which may be applied with suitable changes, to their own local uses, either taking the campaign as a whole or selecting any part of it which may be feasible. We are particularly anxious to give a correct summary of the results and costs of this work and to analyze, if possible, all of the mistakes and successes we may have made.

Another Bee Book

"How to Succeed With Bees" is the title of a new book of 96 pages and paper cover by E. W. Atkins and Kenneth Hawkins, of the G. B. Lewis Company. This book is arranged along different lines than the usual bee book and makes no attempt to give the beginner the fundamentals of life history and manipulation. It assumes that the reader is already familiar with beekeeping practice and gives the accepted methods of practice through the year. On the whole, the advice is good, although the novice may be confused by the fact that the beekeeper's year, which is said to begin at the close of the last important flow, should be placed at August 1. The fact of the matter is that in only a comparatively small part of the best beekeeping territory is it true that no important flow comes after this date. However, the reader is advised to time his operations from the end of the last flow, and the advice to provide young queens and plenty of stores in early fall is sound.

Fall management is followed by instructions for wintering, and this in turn by chapters on equipment and instructions for the active season.

The price of the book is 59 cents.

THE MOST PRACTICAL HIVE

By George W. Pillman.

I STARTED on my beekeeping venture about twelve years ago, by buying two colonies of bees in box hives and transferring them to a pair of Danzenbaker hives that I bought of an eastern mail-order house which at that time advertised this particular kind of hive in their catalog. Although lacking in experience at the time of my purchase of the Danzenbaker hives, I was not long in discovering its shortcomings. Seeing a cut of the Hoffman frame in a bee catalog one day, I bought a pair of the Langstroth hives with frames; I again transferred the combs and bees to the Langstroth equipment. At that stage of my experience I had no knowledge of any larger frame or hive, and as the Langstroth seemed satisfactory in every way, I continued through passing seasons and ever increasing swarms to build up my apiary with that size hive. During the intervening years up to the present date the swarms that refused to be controlled did their part in building up my home apiary to 80 colonies, all of which are now in 10-frame Langstroth hives.

It is said that we "learn from experience," and after twelve years' experience I can now see my mistake in not beginning my beekeeping venture with a larger hive, as the evidence gleaned through experience during those past years has convinced me, without any outside argument or demonstration, that the larger and deeper frame hive is the more practical and labor-saving hive of the two; and the hive I refer to is the Modified Dadant Hive. I can now see, through my experience with the 10-frame L equipment, that the broodchamber of that hive is too small for best results as used singly, and that the extra labor involved in breeding in two broodchambers could be reduced and simplified by using the larger hive.

A recent experience in handling a flow of honeydew with the two-body method, wherein anticipated flows from floral sources made two extractions out of combs containing brood in all stages of development necessary, has quite convinced me of the inferiority of the two-body method as compared with the single large broodchamber. Had I been using the Modified Dadant Hive instead of the two L chambers, a large part of the honeydew which I extracted would have been turned into bees available for the floral flows which followed. Shallow Dadant supers would have better cared for the surplus, and these could have been taken off and extracted with one-half the worry and time required in cutting the cappings from around the brood. Yet the extracted, unsealed brood was a further waste that might have been conserved.

Another fault I find with the Lang-

stroth equipment is, the single broodchamber is not large enough to properly care for the amount of pollen that is brought and stored in the frames at certain times of the year.

I have noted on many occasions in my standard hives—and in queen-right hives that had not swarmed—as many as from seven to nine frames packed from the top to the bottom-bars with pollen, thus restricting the laying room of the queen to from one to three frames and providing just the right conditions to promote swarming. It has been stated that pollen-packed combs need not occasion worry, that the pollen "quickly disappears." This, too, on occasions applies to my location; but I find that much depends on seasonal conditions, etc., as I have observed hives and combs still packed some eight or ten days after a previous examination. I would hardly argue too much pollen, as it is a necessity to brood rearing and is eventually used up. My argument, rather, is in favor of a hive large enough to hold it without restricting the laying room of the queen, and the condition that applies to my location simply indicates the need of a larger hive.

As a choice between hives, I would favor the Modified Dadant hive, first, because its adoption would make impossible the conditions stated above. In the larger and deeper frame hive there is at all times ample room for brood, pollen and honey; whereas, we have noted, with the smaller hive and frame there is often a congested condition, brought about through the storage of large amounts of pollen and honey in the broodchamber.

I would prefer the Dadant hive again because of the larger frame, which allows a larger circle in which the queen can lay, and because the stores are always within easy reach during the winter months of confinement.

I am for the wider spacing between the frames for the reason that it allows more ventilation and makes for less crowding, and because this feature is a contributory factor in reducing the tendency to swarm.

I favor the 6¼ super frames that go with the Modified Dadant hive, because their use would result in a larger number of filled and capped combs at the end of a flow, and for the further reason that they are neither too small nor too large for all-around, handy use and best results.

I am strong for the Modified Dadant hive because it makes unnecessary the use of queen excluders, which are a hindrance to the work of bees in the supers, and another contributory factor to swarming. Previous to my acquaintance with the meritorious features of the Dadant equipment, I had often dreamed of a hive so nicely balanced as to make queen excluders unnecessary, and we

now see this happy feature incorporated in the Modified Dadant hive.

I grow more and more partial to the 11-frame and deep-frame hive as I look in and trace out its many advantageous features and its yet unrealized flexible possibilities. This large hive allows for contraction and expansion as needed. It can be contracted for the production of comb honey, so as to cause a larger amount of honey to be stored in the supers, and likewise contracted with insulation for wintering.

With the use of porous, heat-retaining division boards and prepared boxes of compact insulation for top and bottom packing, I can see how—in our latitude—the Modified Dadant hive can be made to answer every purpose of hive and winter case in one. This hive, with end boards made out of 2-inch material, and insulated as stated, would surely stand the test of the coldest winters we are likely to experience in this zone, and in consideration of the expense, labor and bother that is connected with wintering bees in winter cases, it is my thought that winter cases will shortly be discarded by adopting the larger hive and putting the packing on the inside, with permanently packed boxes to slip under and over the cluster. Were my bees in Dadant hives, this would be my way of wintering.

In summing up my adventure with the Langstroth hive as used single, double or otherwise, I can see that the Modified Dadant hive is the more efficient hive of the two. It is the more efficient because it delivers more goods for a less labor cost of production. The features enumerated are being demonstrated into cold fact every year by those wide-awake beekeepers who are now using this hive, and we have the word of many who have changed to the larger hive, who are quite unanimous in their verdict that the larger hive does produce more honey with less work. Handled in accordance with that very interesting little book, "Dadant's System of Beekeeping," swarming is reduced to a degree of little concern, and the crop is produced and harvested with a minimum of worry and labor. And we speak thus from the observation of others who are using this hive.

I have no argument to present regarding the workableness of the two-body breeding up, or the Demaree supering up method, for I have been using both methods and know, while faulty, that they will work. The faults I find with these methods are, they work the worker and don't weigh enough in the balance of labor-conserving management to pay for the extra work involved in managing an apiary of bees by these methods. My position is: If a labor-saving tool of production and system of management is at hand, that will produce equal results with half the work required with inferior equipment, that we might manage double the number of colonies in the Modified Dadant hives with the extra labor involved

in the two-body breeding up and the Demaree swarm control method, and thereby get twice the amount of honey for the same amount of labor.

Considering the matter of hives from all points of view, it is probable there are many places where the honeyflows are so scant, or different, that all the honey that might be gathered would be bred up into bees in a large hive. As the hive of which we write allows contraction to any degree, such argument would hardly constitute anything in its disfavor; rather, where such conditions prevail, it is doubtful whether it would pay to keep bees in any hive, either large or small.

I would recommend that the beginner try out the Dadant hive first, because it would take less knowledge of beekeeping to enable him to produce a crop of honey in that hive than it would in the smaller hive.

The chances of swarming during a honeyflow with the Langstroth hive—in the hands of the beginner—would be likely to range anywhere from 50 to 90 per cent, whereas with the Dadant hive these figures would probably be kept within 10 per cent, depending on local conditions and the experience of the manipulator.

With a little knowledge pertaining to shade, ventilation and supering, the novice with a small number of the large hives would probably be enabled to produce proportionately as much honey as the near professional, and for the reason that bees kept in the larger hive would require less experienced attention.

Good queens are obviously required for best results with the larger hive; but this applies also to any hive, either large or small, and the beekeeper who keeps any other than the best procurable queens in his yard decreases his production in measure to the egg-laying ability of the queen and the honey-gathering ability of her workers.

As I have settled the matter as to my own future proceedings, any further increase in my home apiary will be housed in the Modified Dadant hive; and should I extend my venture into outapiaries, I should consider no other.

Missouri.

THE INFLUENCE OF LARGE HIVES UPON THE IMPROVE- MENT OF RACES OF BEES

(A letter from Charles Dadant in the
Bulletin of Apiculture for
September, 1883.)

I have been asked many times whether the suppression of swarming will not diminish the vitality of queens and workers.

I do not see how such degeneration could be produced by this cause. It seems to me that the opposite result would be more probable, and that confining bees in hives that are too small, and thus thwarting the

queen in her laying and the bees in their working instinct, would be more likely to bring about the above mentioned result.

Take note of this: When we add empty combs in a hive at the time when the honey harvest begins, the queen finds all the space she needs in which to lay. As her function is to lay eggs, and as she has no other occupation, her instinct is not in any way opposed; on the contrary, it is rather aroused, developed, without any suffering or opposition. She is happy, in the midst of a happy family.

Thus, the suppression of swarming by enlarging the broodchamber has a tendency to increase the fecundity of a queen, since it increases her chances to put it to use. As a matter of course, the daughters of such a queen are bound to be developed into more prolificness by this condition. It appears to happen in this way with us.

We have not yet completely abandoned the rearing of queens for sale, but we sell them at a high price, because we made it a rule not to sell inferior queens, since they are expected to be used as breeders. Taking such queens from very populous colonies, in June-July, during the crop, it has a tendency to cause swarming in the colonies from which they are taken, and when we do have such swarms they are of incredible strength. We harvested swarms during the present year that weighed as much as 15 pounds. Eleven-frame hives were not sufficient for such populations and they would work in surplus stories at the same time as in the hive body. Several such swarms have yielded 50 pounds of surplus honey each, last year, and we have the promise of something similar the present season.

Swarms like these are evidently not from degenerated mothers, although most of the ancestors of those queens have been kept from swarming by management, and although they were themselves reared artificially. The suppression of swarming by enlarging the broodchamber has no bad influence upon the workers, either.

The instinct of the worker bee is to work. In a small hive, the space is soon filled and the workers are compelled to remain idle, clustering outside of the hive. They are soon weary of such inaction, and they decide to emigrate, not so much to obey the natural law of "grow and multiply" as because this inaction is against their instinct.

To summarize this argument: On one side the queens of large hives have room enough to develop their fecundity, so that this quality may increase and develop in their daughters; while on the other side, the queens of small hives have their prolificness restrained and often suspended for want of room, this restraint or suspension having influence in diminishing the fecundity of the race.

Again, in a large hive the entire

population is happy, and the proof of it is in the fact that they do not seek to leave to go elsewhere, while in a small hive every one is ill at ease, and the number of the dissatisfied becomes so great that all the able-bodied go seek a better home, so as to gratify their instinct which urges them to work.

Thus I believe that a little thought will convince the skeptics that it is advisable to have large hives, not only to rear strong colonies and obtain large crops, but also for the purpose of improving the race.

In reply to the above, Edouard Bertrand wrote to Charles Dadant, in a private letter, dated August 10, 1883:

I want to tell you how much I appreciate the article which the mail brought me, on "The Influence of Large Hives upon the Amelioration of Races." It is a subject which I had not yet sufficiently appreciated, and the reasons you give strike me by their correctness and their novelty. It is so very hard to make people understand that there is no beekeeping and no honey without the use of large hives, especially in poor honey countries. In your fertile countries one may succeed even with medium-sized hives; but in Switzerland, where we must watch the crop and catch it, as one might say, "on the wing," we can do nothing with insufficiently developed colonies."

THE HUBER LETTERS

Propolis

To Count Mouxy de Loche:

I feared, sir, that you had not received my letter or that you had too poor an idea of your correspondent; I had asked Mr. de Flumet to tell you that I had written you and to ask you to let me hear from you; he knows the interest which I take in all that touches you, sir, and I trust you will believe it.

When I had the honor to write you, I did not know that you had occupied yourself with the matter of propolis. They had read your memoir at our Society during my sojourn in Lausanne, and it was only during one of the special meetings, when they read the minutes, that I learned that this had been brought forward in the previous meeting. I asked for a communication of your memoir and Mr. Jurine caused it to be handed to me. I read it with the greatest interest; you have succeeded in a very difficult research and the fact which you witnessed had been neither seen nor suspected by any one; except for this, sir, my most sincere compliments.

Permit me to recall your observation, when I will state, in the Society, those which I have made upon the same subject. They do not contradict each other; it was natural that you should believe that the bees had only one mode of gathering propolis; and that you should not find out that they took it off the buds of the black poplar, since you had seen them har-

vest it off the leaves of that same tree. The truth is that they harvest it off both. They take it wherever they find it, we must be assured of that.

When inserting your notice in my memoir, I will mention only the fact stating your discovery, and will omit the exclusive conjecture which you made concerning the buds of the black poplar. I will be charmed, in this occasion as in all the others, to associate my name with that of so distinguished a lover of natural history.

I have done so already in taking advantage of the permission you gave me to use your most instructive note on the Sphinx Atropos; I sent it with my observations to Mr. Pictet, the professor. I do not know whether he will see fit to publish them in the British Journal, perhaps the desire of being of service to the farmers, by warning them of the danger which their bees run through this moth, will induce the publishers to place my observations in the agricultural section, even though they are not of British origin. Mr. Pictet is at Paris now, as representative. I will inform you of his reply as soon as I get it.

It is a very curious trait in the history of bees, or rather in the hand that directs them, this precaution which they take of reducing the entrances of their hives when they are threatened with foreign invasion. This fact was already known in the times of Aristotle. I did not read

it in his book on animals until after I had found it in the book of nature, but without any details upon the manner in which they do it, nor on the shape which they give to this singular work.

I have seen singular varieties in this construction; they deserve to be studied; it is the finger of God that we see there. It is as interesting as it is useful to follow all its divine traces. You are so well fitted to feel it, sir, that I do not hesitate to ask you to concur with me in a research which should be fathomed and which may be enlightened by your lights and your talents.

I have seen some of those reduced entrances which are real works of fortification; they show loop-holes, secret gates of which the openings are hidden, etc. In other cases the wall of propolis and of old wax is perforated with only one opening, slanting, winding, and the access to which may be defended by a single worker bee or two. When they are short of propolis, it is with pure beeswax that they make this singular wall, they manage to mix propolis with it later.

(Note.—Dr. De Planta made the analysis of the substances used by the bees in their fortifications. Here is what he found in the samples which we sent to him: Beeswax 76.27 per cent, propolis 22.15 per cent, water and volatile oils, 1.58 per cent.—Revue Internationale, page 73; also page 51).

This year my bees reduced their en-

trances in the beginning of July; this precaution was evidently taken against robber bees from a neighboring hive; they had left but two little openings for the passage of two workers at most. In August, when the large population and the great crop came, they enlarged those openings, under our eyes, to give freer passage; but in order to prevent too great enlargement they maintained a large pillar at about one-third of their entrance, which, dividing it in two parts, prevented the entrance of the big sphinx. Will we give to ordinary chance the honor of this disposition the aim of which appears so useful?

Do me the favor, sir, of examining your hives and those of your neighbors, and to make a draught of what you will see in hives that are actually stocked. It will not be easy to see this work in all its details; you may do it with more ease in winter, when the bees are quieter. It would be still easier to see it if one had some dead colonies the entrances of which had been reduced. (See *Revue Internationale*, page 235, 1888).

Permit me to ask you for some details upon those hives of the Hautes-Alpes, the construction of which you approved.

I am of your opinion upon the temper of the bees in the bad season. I have also ascertained that potatoes did not attract the bees and that the harvest of propolis is subject to great variations. This year it was very late and scanty.

I have room only to assure you of my perfect regard. F. Huber.
Au Bouchet, near Geneva, November 19, 1804.


LANGSTROTH'S COMMENTS

The description of the use of propolis as fortifications to defend the hive against robbers, whether other bees, wasps or death's head moths, given by Huber in the above article, was commented upon by Mr. Langstroth, in a letter to us, of which we give the manuscript. This was published in the *Journal*, years ago. As Mr. Langstroth's writing was difficult to read we give here the "translation" of it:

"I mail you today a small box with what was once a very perfect specimen of such fortifications as Huber said his bees built against the death's head moth (*Sphinx atropos*). It was built to lessen the entrance of a hive which was about an inch high, and although you may have seen the same kind of work it is the only one I ever met with. You know that Huber has been accused of romancing on this point. I am very sorry that one of my little ones mashed it out of shape, perhaps you can restore it. I give as nearly as I can the original shape. The dots show the entrance as left.

"Your friend,

"L. L. Langstroth."

Chas. Dadant & Son - Dayton Ind 27 1888
Dear Friend - I mail you
to day a small box with what was once a very
perfect specimen of such fortifications as Huber
said his bees built against the Death's head
moth - *Sphinx atropos* - It was built to lessen the
entrance of a hive which was about an inch high -
and altho' you may have seen the same kind of
work it is the only one I ever met with - You know
that Huber has been thought accused of romancing on
this point - I am very sorry that one of my little
ones mashed it out of shape - perhaps you could re-
store it -  I give as nearly as I can its original
shape - The dots show the entrance as left -

Your Friend
L. L. Langstroth

THE EDITOR'S ANSWERS

When stamp is enclosed, the editor will answer questions by mail. Since we have far more questions than we can print in the space available, several months sometimes elapse before answers appear.

EARLY QUEENS—SWARMS

1. Some time ago I sent you a little box with drones in, apparently pulled out of the cells. On March 18 we had a fine, warm day; the bees flew strong. I thought that hive was going to swarm. I stood in front and watched it. Drones were flying, too. I found five queens in front of the hive, the old one and four virgins, two of which were pulled out of the cells. I did not examine the hive inside till April 3; we had some nice warm weather again. I found inside lots of bees, no brood, and one small queen. Do you think she mated on March 18th, and would you leave her in this season? I don't believe she will amount to anything; she is too small. She is not laying yet, April 8.

2. On page 187, American Bee Journal, April, 1924, third column, you will see "Swarms—Sweet Clover." Tell that brother of Indiana to "shine" his bees down if they go to light high up in those big trees. Take a looking-glass about one foot square and throw the bright spot right on the bees when they begin to cluster, and see what that will do. I have driven a swarm of bees back in the hive with a looking-glass when the sun is shining. Dangle the bright spot right on the bees; once tried, always used. Please explain the effect it has on the bees.

PENNSYLVANIA.

Answers.—1. The instance you cite is one of those incomprehensible happenings that we may explain or fail to explain entirely. My guess would be that the colony was exceedingly strong and that when the queens hatched the weather was not suitable for swarming. They probably allowed the queens to fight, so the old queen got killed and perhaps the remaining one got lost. So they had to rear another. In that case, this last queen, which you saw on April the 8th, ought to mate pretty soon. She would then become larger. If this is not the right guess, go ahead and guess yourself.

2. Not only have we been unable to explain why a looking-glass would compel the bees to go back to the hive, but we have been unable to succeed with the looking-glass, although we tried it a number of times. You speak of having driven "a swarm" back to the hive. Have you tried it more than once? Have you succeeded every time? Or even half of the time? If you did, we have something to learn from you. Of the old methods of using a looking-glass, drumming on tin pans and throwing water at the bees, the last mentioned is the only method that ever did any good for us, and even that did not succeed often enough to make us use it regularly.

CLIPPED QUEENS

1. I have my hives on stands about 15 inches high and I am clipping my queens' wings. Will the queen be injured by jumping off the alighting board at swarming time.

2. When a swarm issues and I wish to return them to the old hive, instead of killing the old queen, would it be better to cut out all the remaining queen cells and return the old queen, as she would be ready to lay at once?

CALIFORNIA.

Answers.—1. I do not believe a queen would be injured by falling from a 15-inch bench into the grass. Usually they have some rudiments of wings left, and that helps them to fall gently.

2. Returning the swarm after destroying all the queen cells is not usually successful to prevent swarming, as the bees

often rear fresh queen cells. But if you hive the swarm in a box for 24 to 48 hours, destroying the queen cells in the meanwhile and giving the colony more room, more ventilation, etc., it will often happen that the swarming fever may be over when you return the swarm at the end of that time. This does not always succeed with first swarms, but it is almost invariably successful with secondary swarms.

EXTRACTION—TRIPS—LARVAE

1. I have over 100 colonies of bees and expect to increase to 200 and run for extracted honey. What sized extractor should I buy? My honey house is small and I don't feel able, financially, to build larger; neither do I feel that I can hardly buy a power extractor, on account of cost, and likely not have enough room. I was thinking about buying a four-frame, reversible, hand-power extractor. Would that be satisfactory? Some say that a two-frame would be about as good.

2. If it were possible for a single bee to gather a pound of comb honey, about how far, on an average, would one fly?

3. I saw some place that a bee increased its weight 1550 times in 5½ days after it first hatched. Is that right?

OHIO.

Answers.—1. In my busiest days, I did not use anything but a non-reversible, four-frame extractor. I had tried the reversible and it had gotten out of order, by a piece of the machinery breaking. So we returned to the plain four-frame. We had one at each apiary. As to the power, I would rather pay a boy to turn the crank than to have the noise and the smell of the gas engine. Probably some beekeepers would call me old fogey. But we extracted, I believe, something like 700 pounds per hour. If that is enough for you, just buy the four-frame, hand-power extractor. Beekeeping is made very expensive nowadays, but we can do lots of work at small expense if we will.

2. It would be out of the question for a single bee to gather a pound of comb honey, because a single bee cannot make any comb worth mentioning. Then it is even out of the question to tell how much honey a single bee can carry. Professor Wallace Park, who is perhaps one of the most careful investigators, has shown us that a bee can carry much more water and much more promptly than she can carry honey, evidently because honey is not as plentiful. Professor Koons, of Connecticut, in the A-B-C, has given about 20,000 trips as the average required to carry a pound of honey. So you may figure the distance a bee has to travel if you know how far your bees have to go. But as the crop is quite irregular, it stands to reason that a bee will travel a great deal farther for honey when the yield is light than when it is heavy.

Another thing to consider is that the nectar is more or less ripe, therefore more or less heavy and also more or less to be wasted in evaporation. So that leaves the matter still more undecided. It is now quite universally acknowledged that the bees separate some of the moisture from the honey within their honey sacks. Dr. Brun-

nich has had something to say about this in 1919 and also this season.

3. The increase in weight of a larva over the weight of the egg is something about the amount you mention. The egg weighs very little, but when the larva is 5½ or 6 days old, it weighs more than the adult bee will weigh.

INCREASE

I have a standard eight-frame colony of bees which I would like to increase to two or three colonies, using new Dadant hives and brood foundation, and as I am new with bees I wish you would outline the best method to accomplish this. Sweet clover blooms around here the latter part of June and is our main honey crop.

Please give me your best advice and explain as fully as possible the different steps to be taken.

NORTH DAKOTA.

Answer.—A matter of this kind cannot be answered in a simple letter, because it involves the management of bees during the entire season. It would be best for you to get a textbook and read it. However, I can tell you the main lines to follow:

Since you do not speak of buying queens, you will have to figure on queen-rearing. The best plan is to remove the queen and a good portion of the bees, with perhaps a comb of hatching brood, and let them raise queen cells in the old hive. The swarm thus taken away may be placed near the stand of the old colony, so it may get a portion of the flying bees.

In about ten days, the bees of the queenless hive will have reared queen cells. Then this colony may be divided, giving a queen cell to each half. The supernumerary queen cells will have to be destroyed. With only one colony to work upon, it would be unreasonable to increase to more than three.

The time at which this work must be done must be selected by you. But it should not be undertaken until the bees gather honey freely and the colony is strong in bees and brood. Success and failure depend in great measure upon the honey crop.

RAISING QUEENS

Would it be practical to raise your own queens for about 30 colonies, or would it be cheaper to buy them?

KENTUCKY.

Answer.—Buying queens is cheaper, as we can hardly rear our own queens in the North at as low a price as they can rear them in the South nor as early in spring.

But when it comes to quality, if we are careful to select our queens for breeding cells and can also make sure of a large number of pure drones in the vicinity, we can certainly rear better queens than we can usually buy. However, as most of the beginners in modern beekeeping are surrounded with people having apiaries of common bees, with plenty of common drones, it is quite probable that, in those cases, bought queens are best.

If you propose to rear your own queens, you had best buy some textbook on queen-rearing.

DON'T KILL THE BEES

1. Can you induce one of your versatile editors to protest more vigorously against the notion that bees may be killed in the fall and repurchased in spring? I mean a protest on what I would almost term the spirit of humanitarianism. The thought seems barbaric to me, though I admit ignorance on the economic aspect.

2. Never decrease, but ever increase the attractions of A. B. J., even if the cost to us is greater. All you write on the wintering problem is Dutch to me. Just what

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Save one profit by buying direct from factory. Standard, Jumbo and Modified Dadant Hives; cedar or pine. Write for catalog.

A. E. BURDICK CO.,
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We handle the finest line of bee supplies. Send for our 1924 price list. Our quotations will interest you.

The Colorado Honey Producers' Association, 1424 Market St.,
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Read what J. E. Parent of Chariton, N. Y., says:

"We cut with one of your Combined Machines last winter 50 chaff hives with 7-in. cap, 100 honey-racks, 500 frames and a great deal of other work."



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For sale by all dealers.
If no dealer, write factory.

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NEW CATALOG READY Beekeepers' Supplies

Root's Goods of High Quality. Three-ply foundation, standard stock of supplies kept on hand for prompt shipments. Send us your inquiries and orders early for quick action.

J. NEBEL & SON SUPPLY CO.,
Montgomery County. High Hill, Mo.

GOLDEN QUEENS AND THREE-BANDED BEES FOR 1924

1 untested queen	\$1.00
1 tested queen	1.50
1-lb. package of bees	2.00
2-lb. package of bees	3.00
3-lb. package of bees	4.50
Nucleus, per frame	1.50
Additional pound of bees with nucleus	1.00
No disease; safe arrival guaranteed; bees inspected.	

J. W. SHERMAN, Valdosta, Ga.

1924 PRICE LIST OF BEES AND QUEENS

A 1-lb. pkg. and unt. queen, delivered	\$3
A 2-lb. pkg. and unt. queen delivered	\$4.50
A 2-fr. Nuclei with unt. queen, delivered	\$6
Same as above, with test. queen deliv.	\$7
Strictly nothing but pure Italians shipped.	
Untested Queens, \$1 each, or 12 for \$10.	
In lots of 100, 75c each.	
Golden Bees. R. O. COX, Rutledge, Ala.	

proportions of your readers remain in the East as compared with those under warmer conditions?

Answers.—1. I am very glad of your protest against killing bees in the fall, to buy more in the spring. Yes, you are right, there is a question of humanitarianism, which is usually entirely submerged under the consideration for the almighty dollar. But are we not barbarians in many ways? We freed the slaves sixty years ago, but many of us are ready to spit on them; now that they are free. We proclaim the gospel, but how do we follow it in actual life?

2. I am glad to be able to say that we find many like you, who willingly pay more for the A. B. J., because we can give more attractions than some others. As to the proportion of readers who live where there is no winter problem, it is about a tenth of the entire subscription list.

A VALUABLE PUBLICATION. HONEYBEE LARVAE.

GROWTH AND FEEDING

This is a bulletin, No. 1222, of the Bureau of Entomology, by Messrs James A. Nelson, A. P. Sturtevant and Bruce Lineburg, all experienced students and scientists, on the rate of growth and manner of feeding of the honeybee larva. There are many interesting points in this bulletin and we believe the queen-breeders especially could get much useful information from it.

They inform us, to begin with, that the egg of a bee weighs around one-tenth of a milligram. For the average man, who has learned his arithmetic by pounds, ounces and grains, this word "milligram" is a puzzle. But isn't a "grain" a puzzle as well? You know there are 7,000 of them in a pound, and that does not increase your information very much. Well, put ten bees' eggs together and remember that they make about a milligram, and a hundred of them would make about a centigram. When we come to infinitely small measurements, we are very much in the same trouble as with very large ones, our imagination does not reach far enough; so the number of pounds which our earth weighs is about as hard to appreciate as the weight of a bee's egg.

They tell us that there is quite a difference in the growing of larvae; some of them, weighed after three days of growth, weighed 25 milligrams, while others weighed only a trifle over 12 milligrams, or about half as much. After four days, they varied from 50 milligrams to 89.

But there is too much of a detail of weights for us to describe all. Suffice it to say that the growth of larvae is so prompt that, in five days, they were found to average 146 milligrams. So we may safely assume that a larva of the honeybee increases its weight about 1,500 times before its cell is sealed. This gives us an idea of what a great quantity

of food is needed in brood rearing. We may then better understand why instructors in queen-breeding insist on the necessity of feeding the bees heavily when they breed.

But we cannot go into all the details found in this bulletin. They give us the "effects of underfeeding," "effect of no honeyflow," "effect of stimulation," "nature and composition of brood food," etc.

They quote freely from Von Planta, who made very thorough studies of these matters in 1888-9. It was this man who gave the first explicit descriptions of the composition of the "royal jelly" and who stated that the queens alone were fed from this during the entire time of their growth.

But our experimenters have failed to make weighings of queen larvae and drone larvae. These would have added to the interest. We hope they may do so and give us additional information later.

Mentioning the speed of growth of larvae, they give us an example of still quicker growth in the larva of a fly, *Sarcophaga*, whose larva gained 451 times its initial weight in about 71 hours.

Diagrams are given of the growth of the larvae, which would surely be important to beginners in queen-rearing, as they exhibit the appearance of the larvae each day, in comparison with the size of the cell.

Enough said. To our mind this is one of the most interesting of the bulletins of the Department of Agriculture lately issued. C. P. D.

KEEPING AWAY ROBBERS WHEN OPENING HIVES

By Ray Moore.

At the time you are making a thorough examination in the spring, when robber bees are likely to make trouble, be sure to have a good smoker at hand and going well, and also a hand sprayer for throwing a fine spray, filled with sodium-hypochlorite solution (as recommended for curing European foulbrood, known as the Lewis treatment), such as made and recommended by Arthur C. Miller. This solution is invaluable when working with bees. I first blow a little smoke in the entrance, then remove the quilt, and spray all over the top of the frames. You won't be troubled with robbers, for they certainly don't like the odor of the sodium-hypochlorite. This solution, used for no other purpose than to keep away robbers, is certainly worth more than its cost to me; and I have cured several colonies of European foulbrood with it. It works best when the colony is strong, and by caging the queen for a week. Sometimes one treatment will suffice; sometimes two or three treatments are necessary, at intervals of a week or ten days.

Illinois.

DOES BEEKEEPING PAY?

By W. A. Shelly.

Which is the most profitable—a fair crop with a poor price or a poor crop with what is considered a fair price? What should it cost per year to run 500 stands of bees? If it cost me only \$2.75 per case to produce 1100 cases of comb honey from 500 stands of bees in 1922, why should it cost me \$4.34 per case to produce my crop in 1923 simply because I only produced 435 cases of comb honey?

These are some of the questions that have kept me lying awake nights.

In checking up what it cost me to produce my 1923 crop, I find I have the following expenses, and none of them avoidable:

Supplies (including \$200 up-keep)	\$ 537.50
Taxes and interest	550.00
Rent on bee locations	175.00
Truck expense	100.00
160 days' labor at \$4	640.00

\$2002.50

Sold 435 cases comb honey at \$4.13 1/2	\$1800.50
---	-----------

Loss	\$ 202.00
------	-----------

So now, for the fifth consecutive year, I have not received as much for my honey as it cost me to produce it.

Is this going to continue?

Do I put in too much labor according to the amount of crop I produce, or do I fail to get the best results from my bees. I try each year to have my bees in better shape than I had them the year before, and I always have considerable better than the average amount produced for my county; this year, 1923, my crop was 100 per cent better than the average. Naturally, after a season is over one can see mistakes he has made. This past season, for instance, I thought I would try making 100 stands of increase, and add to my profit a little by having 100 stands of bees to sell in the fall. But it did not work out right. When fall came I could not find a buyer for the bees at what the equipment cost me, not counting the bees, queen, drawn combs, honey, etc., so I will just have to charge them up as investment. Of course, making the increase may have cut down on my comb honey crop to some extent, but I do not know that it did.

I see the politicians predict prosperity for the coming season, so I hope to make a big crop this year and get a big price, although the prospects for a big crop of honey in California this year are anything but promising.

But we always hope;
We always have to hope.
California.

INCREASING BEE PASTURE

By Leroy Churchman.

The Cloverdale people of Mt. Hope, Kansas, have what they consider an excellent plan for increasing bee pasture.

WE MANUFACTURE FOUNDATION

— Our Specialty is —

Working your wax into foundation, for cash or wax in payment. Write us for list of supplies and get our prices on the best Hives, Sections, Frames, etc., made in Wisconsin.

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Fifty-two Years' Experience in Queen-Rearing
Breed Three-Band Italians Only

	Nov. 1 to June 1			June 1 to July 1			July 1 to Nov. 1		
	1	6	12	1	6	12	1	6	12
Untested	\$2 00	\$ 8 50	\$15 00	\$1 50	\$ 7 50	\$13 50	\$1 25	\$ 6 50	\$11 50
Select Untested	2 25	9 50	18 00	1 75	9 00	16 00	1 50	7 50	13 50
Tested	3 00	16 50	30 00	2 50	12 00	22 00	2 00	10 50	18 50
Select Tested	3 50	19 50	35 00	3 00	16 50	30 00	2 75	15 00	27 00

Select tested, for breeding, \$7.50.

The very best queen, tested for breeding, \$15.

Capacity of yard, 6,000. I sell no bees by the pound or nuclei, except with high-priced tested and breeding queens.

Queens for export will be carefully packed in long-distance cages, but safe delivery is not guaranteed.

JOHN M. DAVIS, Spring Hill, Tenn.

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Yancey Hustlers.

Three-Band Strain, Only

Our bees are building a reputation as honey-producers in every section of the country. If you are not satisfied with your present strain, order a few packages of the Yancey Hustlers, headed by our select young queens, and we will get your future business. Our motto, "Every Customer a Booster."

Safe arrival and satisfaction guaranteed on every package and queen shipped. We are now booking orders for spring delivery, and will be glad to send you prices and full particulars. No more orders booked than we can fill promptly on dates specified.

Caney Valley Apiaries, Bay City, Texas
YANCEY BROS., OWNERS

The plan wouldn't have worked so well five years ago, but today people have a different attitude toward sweet clover.

This spring, Mr. Charles D. Mize bought enough clover seed to sow several pastures, fields and all the roadsides for a four-mile square around his apiary at Mt. Hope. The roads were sown in a day by taking a Ford car and a Cyclone clover seeder. This required two people—one to drive the car and one to stand on the fender or sit in the door and run the seeder.

A hundred miles of road can be sown in a day by this method. It is best to make a round on each road, sowing one side at a time.

It will surprise you how much bee pasture you can sow in this way, and it will surprise you how much interest it will create among your neighbors. We finished our territory two weeks ago, and our neighbors have used the seeder every day since we finished, and we still have several calls for it.

HONEY LUNCHEON SERVED BEEKEEPERS

A honey luncheon is undoubtedly the most novel one served in Terre Haute for a long time, yet at the beekeepers' meeting today (Friday), at the Y. W. C. A., every article on the menu was made with honey. Delicious? More than that. The menu included half grapefruit sweetened with honey, baked ham with honey,

scalloped tomatoes sweetened with honey, baked beans with honey, honey bread, honey apple sauce, cottage cheese mixed with honey salad, honey mousse, frozen; honey drop cakes and honey tea.

Following are the recipes used in its preparation:

Honey drop cakes— $\frac{3}{4}$ cup honey, $\frac{1}{4}$ cup fat, $\frac{1}{2}$ teaspoon cinnamon, $\frac{1}{2}$ teaspoon cloves, $\frac{1}{2}$ teaspoon soda, 2 tablespoons water, $1\frac{1}{2}$ to 2 cups flour, 1 cup raisins, 1 egg. Heat honey and fat until fat melts. While mixture is warm add spices. When it is cold add egg, water, raisins and flour. Add enough flour to make a dough that will hold its shape. Drop spoonfuls on a greased pan. Bake in moderate oven.

Honey mousse, frozen—Beat four eggs and add to a saucepan containing one cup of honey, heated slightly over the fire. Cook, with constant stirring, until the mixture is as thick as thick cream. Cool, and beat into it one pint of whipped cream. Put into a covered mold, seal the joints, and pack in equal parts of ice and salt for four hours.

Baked beans with honey—Cook one quart of navy beans until tender. Season with salt and pepper to suit your own taste, then put in one tablespoon of lard and four tablespoons of honey. Bake one hour.

Honey apple sauce—Core four pounds of green apples, and divide into eighths without paring. Cook in a covered kettle in one cupful of

cider vinegar until apple skins are tender, stirring once in a while to secure exposure of all to the vinegar. Add two cups of honey and one teaspoonful of ground cinnamon, and let the whole cook until the consistency of marmalade. Care must be taken to avoid burning. Store in sterile jars.

Cottage cheese with honey salad—Mix enough strained honey with cottage cheese to make taste agreeable. Place spoonful on lettuce leaves and on top place spoonful of salad dressing.

Honey tea—Add liquid honey to hot water until desired flavor is obtained. This is a healthful, appetizing substitute for tea.—From the Saturday Spectator, Terre Haute, Indiana.

The above menu was prepared by Prof. Mary L. Matthews, head of home economics department of Purdue University. Indiana beekeepers should appreciate the services of Purdue in bringing the possible uses of honey to public attention.

Strawberry Crop Good in South

Reports appearing in the Chicago Packer are to the effect that the strawberry crop throughout the Southern States is excellent this year. In fact, movement started for the North in carload lots as early as April 1st. The largest early shippers of berries are the states of Louisiana, Alabama, Mississippi and Texas.



ITALIAN QUEENS



FOR 1924 OUR OLD RELIABLE THREE-BANDED ITALIAN QUEENS will be shipped from one of the largest and best equipped queen-rearing yards in the SOUTH.

We have bought the queen-rearing department of one of the largest beekeepers of the state and have added it to ours, which will enable us to put out double the amount of queens as heretofore.

We are now booking orders for spring delivery, one-fourth cash. Safe arrival guaranteed in U. S. and Canada. Circular free.

Untested, \$1.25; 6, \$6.50; 12, \$12. Tested, \$2.50; 6, \$14. Select Untested, \$1.50; 6, \$8; 12, \$15. Select tested, \$3 each. If you once try our queens, you will always use them.

JOHN G. MILLER, 723 C STREET, CORPUS CHRISTI, TEXAS

You can have cash for your wax and old combs or cappings at the market price, or we allow a little more in exchange for supplies

Write for our terms and prices

"Falcon" Supplies, Queens, Foundation

Booklet, "Simplified Beekeeping for Beginners" free

Write for catalog

W. T. FALCONER MFG. COMPANY, Falconer, (NEAR JAMESTOWN) N. Y., U. S. A.

"Where the BEST Beehives come from"

METAL CONTAINERS FOR HONEY

The Bulletin of the Societe Romande of Switzerland, in its February number, contains a report from E. Elser, of the Bacteriological Institute of Liebefeld, at Berne, giving the result of his experiments upon the three metals, aluminum, iron and zinc, as honey containers, with their resistance to the acids of honey. It appears that aluminum becomes more and more a favorite for honey containers.

Alloys, such as tin, withstand the tests well.

A glass jar, containing between 50 and 100 cubic centimeters was filled with fall honey of 1922, of their own production. Pieces of aluminum, iron and zinc of similar size were placed in this honey so that they were almost completely covered with it. The jar was closed, and after a lapse of time the pieces of metal were carefully removed, cleaned and weighed. The following results, showing loss in weight, were obtained:

	Aluminum	Iron	Zinc
Original Wt.---	1.3896g	15.7169g	5.9695g
After a month---	1.3896		
After 2 months---		15.7149	5.9684
After 4 months---		15.7138	5.9671
After 6 months---	1.3892		
After 10 mo.---	1.3892		

This shows that aluminum, exposed for 10 months to the influence of the acids of honey sustained a loss of only a few tenths of milligrams. But iron and zinc, after four months, show a loss six or seven times greater than aluminum shows in ten months. Iron loses 3.1 milligrams and zinc 2.4 milligrams. As a matter of course, honey loses in quality according to the quantity of metal which it dissolves, and cases have been known where honey acquired toxic properties, owing to its metallic content. The same may be said of preparations for feeding bees.

We may add to this from our own experience that, when honey is kept in tin of low grade, lead tin, or imperfect tin, after two or three years the parts where the imperfections are to be found show a darkening of the honey. It is most evident in tin pails or cans where the cut of the tin has not been covered with solder on the inside of the pail. This was the case

with the early containers which were manufactured in the local tin shops for us some fifty years ago. The cut edge, uncovering the iron, made a very plain dark streak in the honey, when it had remained full of honey for at least one summer. Lead tin, naturally dull in appearance, showed still more dull after emptying the honey. In the case of this latter metal, there is a real danger from poisonous lead compounds. So we must always make sure that our tin is bright.

We may add that ordinary sugar syrup acts very much more quickly upon metals than honey does. Fill a tin can with honey and another with sugar syrup. Leave them stand a year, then empty them. You will find that the honey pail is bright still, except, perhaps, where there was contact with the air at the top of the honey. But the pail containing sugar syrup will usually be quite rusty. This is evidently due to the stronger acids present in chemically made sugars.

Do not use second-hand containers if you can help it for your honey. Avoid keeping it in any receptacle where iron is exposed.

HONEY WANTED

We are ready at any time of the year to take in small or large lots of extracted honey.

Send us a sample and advise quantity you have and the price wanted.

HOFFMAN & HAUCK, Woodhaven, N. Y.



For years we have been shipping thousands of pounds of bees all over the U. S. and Canada

Order Direct from this Ad.



We are prepared to take care of your rush orders

- 2-lb. package bees, \$3.75 each, 25 or more, \$3.60 each.
- 2-frame nuclei same price as 2-pound packages.
- 3-lb. package bees, \$5.25 each; 25 or more, \$5.00 each.
- 3-frame nuclei same price as 3-pound packages.

Untested queens, \$1.00 each; 25 or more, 85c each; \$70.00 per hundred.

This is a special SALE on untested queens of high quality.

Select untested, \$1.70; 25 or more, \$1.50 each.

Select tested, \$2.65 each; 25 or more, \$2.25 each.

Tested, \$2.25 each; 25 or more, \$2.00 each.

Breeders, \$5.00 to \$15.00.

ITALIAN

CARNIOLANS

GOLDENS

AULT BEE COMPANY, San Antonio, Texas
SUCCESSORS TO NUKES COUNTY APIARIES

HONEY

We Buy—We Sell

**DO
YOU GET
OUR
BEEKEEPER'S
BULLETIN**

We want honey all the time to supply our customers everywhere. You will find it profitable to keep us informed as to what you have and send us samples.

ALSO—If you need honey to supply your own trade, let us quote you. We also handle Airco Foundation, honey containers and bee supplies. Foster your business.

—BEES FOR SALE—

THE FOSTER HONEY & MERC. CO.
BOULDER, COLORADO

QUEENS

The season is near when you will be in the market for queens, and I shall be pleased to supply you. I endeavor each year to produce queens just a little better than I did the year previous, to improve my stock a little and render just a little better service. I feel that for the season of 1924 I have several advanced features that will benefit my customers. A card will bring our literature.

Queen Prices:

Before July 1	Each	After July 1	Each
1 to 4	\$2.00	1 to 4	\$1.50
5 to 9	\$1.95	5 to 9	\$1.45
10 or more	\$1.90	10 or more	\$1.40
		In lots of 100	\$1.20

Breeding queens, service guaranteed for the season, \$10.00 each.

JAY SMITH, VINCENNES, IND.
ROUTE 3

BEE SUPPLIES

Root Quality Bee Supplies are standard everywhere because they are the best. We carry a complete line.

SEND FOR 64-PAGE CATALOG

A. I. ROOT COMPANY, 293 E. 6th St., St. Paul, Minn.

Quality with Service

THE BUYER'S END

By Frank L. Morgan.

I have just read L. T. Floyd's "More About Packages," on page 126. I would like to say that I certainly agree with him, but he puts it very mild. Here is the way the queen business worked out: I ordered queens from seven different breeders from seven different states. Only one lived up to his advertisement. In my desperate attempt to get queens on time I went as far as to pay down one-fourth of the purchase price as early as October for the next spring's delivery, and asked them in October to not accept the order if they could not send on the date I wanted them. When they got the one-fourth deposit they all agreed to that. But when it came time for the queens they were always late—from 12 to 35 days late.

I used to buy my queens; now I raise my own. I ordered 140 packages from some southern men; when they came they were a sight—almost all dead. I got bad order notation from the express company and advised them by wire.

Then I sent all the cages, dead bees and all, back. They then said it was so late that they would have to wait until next year. I had to employ an attorney; it took 10 months to get the money. The result was: \$50 for expenses, loss of honey crop, and a few gray hairs. My next experience was with a man in California. I sent him money in the winter for spring delivery and put great stress on a certain date and, as usual, he accepted the order. This was for one hundred packages. The first fifty were 10 days late. I began to wire. After a few more days an answer came saying "more bees coming." Then twenty-five packages came, twenty-five days late. Another telegram and no answer to explain this at all. And then the last twenty-five came forty days late. Now see how this turned out. The first fifty made sixty pounds, each, surplus. The second twenty-five made only enough to winter on, the next twenty-five had to be fed some for winter.

Now, friends, this may sound like I am a kicker, but I am not; am only trying to tell you what some consignees have to stand.

World Agriculture

The latest number of "World Agriculture" contains an interesting account of the work of the well known botanist and beekeeper, John H. Lovell, with photographs of Mr. Lovell and of his home grounds. World Agriculture is a unique publication, dealing with all lines of agricultural activity throughout the entire world. It is well illustrated and is the official organ of the World Agricultural Society. Subscribing members pay \$2 per year, including subscription to the magazine. Those interested should address the Secretary, World Agricultural Society, at Amherst, Mass.

COMPOSITION OF PROPOLIS

By Alin Caillas.

It has been admitted for many years, and all beekeeping books are agreed upon this point, that propolis is a resin, gathered by the bees, in spring, upon the buds of trees.

This definition is only partly correct, for although propolis contains a notable quantity of what is called resin in chemistry, it contains also other substances. This unpretending study is intended to make them known.

First, the following experiments will establish our views firmly:

1. If we try to dissolve propolis in pure boiling alcohol, we will ascertain that this reduction is always incomplete. There remains in the bottom of the test tube a yellowish and oily residue, which coagulates in cooling, while the remainder of the liquid turns to a greenish brown color. Thus we find a mixture of substances, with different degrees of solubility in alcohol. The residue mentioned turns out to be pure beeswax, while the dissolved material is composed of a mixture of resins.

2. Mr. Perret-Maissonneuve, in his remarkable work upon queen-rearing, makes the statement that, when propolis is heated it separates into two substances. He expresses it as follows:

"If we melt over water, in a bain-marie, some propolis secured from the cleaning of frames, it will separate into two parts; one part, viscous and dark, settles at the bottom of the recipient, while the other part, more fluid, may be drawn off, and produces an aromatic wax which we have named propolis-wax, which, after being kneaded once, will remain as malleable as modeling wax, while a trifle more adhesive."

If we bring these two experiments together, we find that they give similar evidence. A practical and minute examination gave us the identification of the two substances: propolis-wax is similar to the oily substance insoluble in alcohol, while the greenish brown substance is the same that dissolved in ethyl alcohol.

The propolis-wax of Mr. Perret-Maissonneuve is simply beeswax with which is mixed a small quantity of a resin soluble in alcohol at a similar temperature. The other solvent is pure resin.

These experiments enable us to ascertain that ordinary propolis is really a mixture of three substances:

1. About 70% of resin, or perhaps 60% of it fusible between 90 and 100 degrees.
2. 10% of resin fusible between 65 and 70 degrees.
3. About 30% of pure beeswax.

Professor Bouvier, member of the Institute of France, professor at the Museum of Natural History of Paris, kindly presented the statement of his researches at the meeting of the Academy of Sciences of November 26th last. He dwelled upon the practical results of this study and pointed

at the possible increase of information upon the following facts:

1. Propolis, until lately, has been considered as worthless material, as of being of negligible value. It has just been shown that it contains about a third of its weight in pure beeswax, which may be separated easily and almost without cost.

2. In a more general point of view, we may ascertain that we are still very far from a complete acquaintance with the habits of the bee. No beekeeper, no entomologist has yet informed us concerning the manner in which an intimate mixing of these two substances has been perpetrated within the darkness of the beehive. No seeker after facts has yet taught us how bees practice this operation of mixing beeswax with the resin gathered upon trees, and which ones of the workers are entrusted with this task.

For those who seek the "why" of things, the field of researches is vast. Whatever they find, they will admire, as we do, the wonderful intelligence of the bees. They have taken into account the fact that resin was a brittle substance which might crack or chap, following changes of temperature. They understood that an alloy was needed which would close up the cracks owing to its pliability. This substance is beeswax.

Thus bees have brought together these two substances in certain proportions, uniting sticky and brittle propolis with plastic and malleable wax, and have obtained a cement having the required qualities for the intended use.

This shows us that sciences are welded together and that a simple chemical test may draw our attention to a neighboring science, that of entomology, with researches that may be quite beneficial to beekeepers.

Bees at National Farm School

A course in apiculture was introduced at the National Farm School in 1921 as a course in light agriculture for vocational trainees of the United States Veterans' Bureau. The course was given together with the naturally related courses in small fruit culture, orcharding, and poultry husbandry. Each student was given charge of and made responsible for the management of a colony which he divided artificially, managed for surplus, and finally put into condition for overwintering.

Now the practical work of the course is divided into about a score of operations or jobs beginning with the assembling of a hive and ending with the final preparations for overwintering. The student is required to write up each operation as per form under the headings (1) Name of operation; (2) Purpose of operation; (3) Equipment required; (4) Mode of procedure. That is, the student is required to keep a laboratory note book in which he carefully writes up the "experiments" he performs in the laboratory of the apiary just as he keeps a chemistry or phys-

QUINN'S QUEENS of QUALITY

Have no superior. "There's a reason"; are Mendelian bred, good qualities accentuated, GRAY CAUCASIANS, GRAY CARNIOLANS, GRAY LOWER AUSTRIAN queens. Queens imported in 1923, insure extreme vigor. Laws of heredity strictly observed. My queens are produced by selective breeding, in accord with these laws of nature that must be understood and applied before the best can be had, and is found only in Quinn's Quality Queens. A trial will convince YOU of their value, as satisfied patrons testify by repeat orders. Internationally known the world over.

CHAS. W. QUINN

IOWA QUEENS

Italian Queens of SUPERIOR Quality.

My queens are reared in strong cell-building colonies, are mated in big, strong nuclei and are first-class in every way.

1924 Prices

Untested ----- 1, \$1.25; 10 or more, \$1.15
Select untested --- 1, \$1.60; 10 or more, \$1.50
Tested ----- 1, \$2.00; 10 or more, \$1.90

Will begin shipping about the 1st of June. Queens will be shipped in large long-distance cages, and I personally see that every queen is laying and in good shape when caged.

Pure mating, safe arrival and satisfaction guaranteed or your money back.

Place your order and get service and Quality.

Valley Apiaries, Lamoni, Iowa.

ORIN STANLEY

QUEENS

By Return Mail.

\$1.00 each, 10 or more, 90c each. Three-band Italians or Silver Gray Carniolans from imported stock direct from Carniola.

J. E. WING,

155 Schiele Ave., San Jose, Calif.



CARNIOLANS

are very gentle, very prolific at all times, build very white combs, are excellent workers, resist diseases as well as any other bees and do not swarm excessively. Intelligently managed. Ask for my free paper, "MERITS OF THE CARNIOLAN BEE."

I can supply Carniolan queens of my own strain; 12 years' selection and breeding, JAN STRGAR CARNIOLA, EUROPE strain. Breeders imported 1923; Italian, C. B. Hamilton strain.

1 untest. queen, either strain ----- \$1.50
12 unt. queens, either strain ----- 16.00
Tested queens each ----- 2.50
Safe arrival by mail and satisfaction guaranteed.

ALBERT G. HANN,

GLEN GARDNER,

NEW JERSEY

ITALIAN QUEENS

The Quality Kind.

Three-bands that hustle, Goldens that please. One, \$1.00; dozen, \$11.50. No disease. Satisfaction and honest service guaranteed. Send in your order; no regret will follow. Satisfied customers everywhere.

CRENSHAW COUNTY APIARY,

Rutledge, Ala., U. S. A.

ics laboratory note book for those subjects. Every operation satisfactorily performed and written up counts as a credit unit toward his final credit for the completed course.

Demonstrations by the instructor, lectures and assigned readings precede the actual performance of each job by the student. A thorough knowledge of the life of the bee and of bee behavior is essential, and each operation about a hive and in the apiary should be in harmony with bee behavior. Therefore, the better we understand bee behavior the more scientific and productive of results can our operations in the apiary be.

A student who shows particular inclination toward an interest in the course in beekeeping may in his senior year select a so-called project in beekeeping which consists in the management of an outapiary. He is given full charge and responsibility. He is required to keep daily records of all operations, note weather conditions and the time of the flowering of the principal nectar-yielding plants. He is required to make an inventory at the beginning and again at the conclusion of his project, keep strict account of all expenditures of money, material and time, and thus be able to give a final report on the practical, financial success of his project work.

This summarizes the work in the department of beekeeping at the National Farm School, Bucks County, Pennsylvania. It extends over a period of two years, or three years for the student who selects it as a specialty.

Prof. Henry Schneider, Instructor in Biology, has charge of the work.

Honey-Lemon Pie

- ¾ cup extracted honey.
- 2 level tablespoons flour.
- 1 lemon.
- ½ cup cold water.
- Yolks of four eggs.

Beat the yolks and honey with egg beater. Mix the flour and water together and add; then add the juice of one lemon. Cook in double boiler or over hot water until quite thick. Then add half of the beaten whites of eggs to mixture. (Beat.) Pour into baked pastry crust. Add two tablespoons of pulverized sugar to the rest of the whites of eggs and place on top of pie. (Brown in oven.)

Burt W. Ritter.

Northern Bees

We have received a snap shot of a nice little apiary owned by E. O. Boyd at Rife, Alberta, which he believes to be the northernmost apiary on the North American continent. The number of supers on the hives indicates prosperity among the bees. Mr. Boyd writes that the growing of Siberian yellow-flowered alfalfa makes it possible to keep bees as a profitable business north of the fifty-fourth parallel.

Leininger's Strain of Italians

We have been queen breeders for nearly 50 years. In all this time we have tested nearly every strain of Italian bees in the U. S. A. By this careful selection and breeding we have succeeded in producing a strain of bees surpassed by none but superior to many, bees that are gentle and great honey gatherers.

Therefore, if you buy queens from us you may be assured that back of them are nearly 50 years of careful breeding for the production of honey.

As we are located in a red clover belt, it is but natural that our bees should have a long-tongue reach.

We will sell queens from this superior strain as follows:

Untested, 1 to 5, \$1.00 each; 6, \$5.50; 12, \$10.50; 100, \$85.00.

Tested, \$1.50 each; 12, \$15.00; select breeders, \$5.00 to \$10.00 each.

Safe arrival and satisfaction guaranteed.

Fred Leininger & Son
Delphos, Ohio

2 AND 3
POUND

PACKAGE BEES

2 AND 3
POUND

NONE BETTER AT ANY PRICE

2-lb. package Italian Bees with select Italian queen\$5.50; 5 or more \$5.00
3-lb. package Italian Bees with select Italian queen 6.50; 5 or more 6.00

Special prices on quantity lots.

Receive FRESH bees and SAVE express charges.
Illustrated circular free.

VAN'S HONEY FARMS, Hebron, Ind.

MACK'S QUEENS

Are reared to suit the most particular beekeeper. They are gentle, hardy and very prolific. Every purchaser must make us a satisfied customer or money back. Customers who purchased our queens sparingly the past season are now sending in their orders for 50 and 100 lots. If they did not satisfy, would such customers be so liberal? Just send for free catalog and read why they satisfy.

We breed the 3-band Italians only.

	1 to 49	50 to 99	100 up
Untested	\$1.00 ea.	\$.95 ea.	\$.90 ea.
Select untested	\$1.25 ea.	\$1.20 ea.	\$1.15 ea.

Capacity, 1,000 queens per month.

HERMAN McCONNELL, Robinson, Illinois

BEEKEEPERS WE MANUFACTURE DOVETAILED HIVES, HOFFMAN FRAMES, SECTIONS AND SHIPPING CASES

Our hives are made of best grade White Pine, cut accurate and smooth to standard measure. Sections are made of Basswood, polished on both sides. There are no better made.

We carry a complete line of everything in the apiary. Our shipping facilities are as good as can be found anywhere. We want your business. We guarantee prompt and satisfactory service. Price list free.

MARSHFIELD MANUFACTURING COMPANY, Marshfield, Wis.

QUEENS **Superior Italian Queens** QUEENS

STOP LOOK LISTEN

So far as your 1924 crop is concerned, this is the most important month. Failures and delays will mean so much to you that you cannot afford to take a chance on placing your order. We are going to tell you what we have, you can be the judge whether or not you can afford to risk us with your orders for QUEENS. We have everything else out of the way and not a thing to do but take care of your orders for queens. We have 2,000 nuclei mating queens. We have every bit of this equipment in the best possible condition for producing the most and **ABSOLUTELY THE BEST QUEENS THAT IT IS POSSIBLE TO PRODUCE.** Everything that forethought can supply is ready to handle your order to your entire satisfaction. We have sufficient competent office help that will acknowledge every order, whether for one or one thousand queens, and advise you when you can expect your queens. Most of the time we are able to ship orders of 100 within two days of receipt. If you are in a rush, get your bank to wire night letter for queens you want, and guarantee payment. The time you will save will more than pay for the message.

Two-pound package or two-frame nucleus with queen, \$4.50; ten or more, \$4.00.

Three-pound package or three-frame nucleus with queen, \$5.50; ten or more, \$5.00.

One Untested Italian Queen, to June 15, \$1.25; after June 15, \$1.00; ten or more, to June 15, \$1.00; after June 15, 75c.

One Tested Italian Queen, to June 15, \$2.00; after June 15, \$1.25; ten or more, to June 15, \$1.50; after June 15, \$1.00.

A Full Line of Supplies. Send for Catalog.

THE STOVER APIARIES, MAYHEW, MISS.

JUNE DELIVERY ON

BERRY'S QUEENS AND PACKAGE BEES

TRANSPORTATION PAID

After 28 years of select breeding our strain of three-banded Italian bees continue to excel for gentleness disease resisting qualities and honey production. "Nough said."

Prices, Transportation Prepaid:

1-lb. pkgs. with select queens, \$3.25 each; 12 up, \$3.00 each.

1½-lb pkgs. with select queens, \$4.25 each; 12 up, \$4.00 each.

2-lb. pkgs. with select queens, \$5.25 each; 12 up, \$5.00 each.

3-lb. pkgs. with select queens, \$6.25 each; 12 up, \$6.00 each.

Untested sel. queens, \$1.00 each; 6, \$5.50; 12 up, 75c each.

Tested sel. queens, \$2.25 each; 12 up, \$2.00 each.

We guarantee our bees and queens to arrive in good condition and to give entire satisfaction. Otherwise we will replace, or return your money, as you may prefer.

M. C. BERRY & CO., ^{BOX} 697 MONTGOMERY, ALA.

PLEASE DO NOT READ THIS

unless you are genuinely interested in obtaining good queens. Beekeepers are realizing more than ever before the importance of having ALL their colonies headed with young, prolific queens of a known honey-gathering strain. Order Root Quality Queens and be convinced of their merits.

QUEEN PRICES

	Quantity: 1 to 9	10 to 24	25 to 49	50 to 99	100 or over
Untested	\$1.50 ea.	\$1.35 ea.	\$1.25 ea.	\$1.10 ea.	\$1.00 ea.
Select Untested	2.00 ea.	1.80 ea.	1.70 ea.	1.55 ea.	1.45 ea.
Tested	2.50 ea.	2.25 ea.	2.10 ea.	2.00 ea.	1.85 ea.
Select Tested	3.00 ea.	2.70 ea.	2.55 ea.	2.40 ea.	2.25 ea.

The best beekeeping authorities agree with us in the opinion that the shipping of bees on combs containing honey and brood invites the spread of disease. We are now shipping bees only in combless packages.

Prices of Bees in 2-Pound Combless Packages by Express up to August 15:

	1 to 9 pkgs.	10 to 24 pkgs.	25 or more pkgs.
2-pound packages of bees	\$6.00 each.	\$5.50 each.	\$5.00 each.

Add price of queens wanted to package price given above. Large quantity lots quoted on application. These prices are f. o. b. shipping point. Note: Early spring delivery on package bees will be made from Bay Minette, Ala. Beginning May 20, package orders can be filled from Medina.

The A. I. Root Company West Side Station Medina, Ohio



"Hawkeye" Corrugated Comb Honey Shipping Cases

The up-to-date case for the progressive beekeeper.

For full particulars and samples write

THE IOWA FIBER BOX CO., Keokuk, Iowa

The shipping season and all orders filled it leaves me with a very fine lot of queens for sale which I can deliver by return mail.

Every queen guaranteed purely mated and tested out before shipping. Safe arrival and no disease.

Single, \$1.00 each, 6 for \$5.50, 12 for \$10.

I also have a fine lot of tested queens at \$2.00 each, 6 for \$10.00, 12 for \$18.00. In lots of 25 or more write for special prices. Three-frame nuclei \$4.50 each, with select queens.

Will close yards on August 15.

A. B. MARCHANT, JESUP, GA.

Reference: Brunswick Bank and Trust Co.

What a Whale of a Difference Just a Few Cents Make!!!

Good queens are absolutely necessary if you are to succeed with bees. The price of a cheap queen plus the price of a pound or two of honey brings one of our dependable queens that may mean many extra pounds of honey for you. **SCOTT QUEENS** are **GOOD QUEENS**. Every one laying, and laying well, before mailing. Located in the North, our queens reach you quicker and with less chance for rough handling and injury in the mails. Only good queens shipped.

Golden or Three-banded Queens

	To July 1	After July 1
1 untested queen	\$1.50	\$1.25
6 untested queens	8.00	7.00
12 untested queens	15.00	13.00

We guarantee safe arrival and satisfaction. Orders booked now. Queens ready June 1. Card brings circular.

THE SCOTT APIARIES, LAGRANGE, IND.

BEES BRED FOR HONEY GATHERING QUEENS

Moore-Howe strain from select mothers chosen from 1,000 colonies for honey-gathering, white capping, uniformity of color and gentleness.

First premiums for five years in my section on queens and nuclei.

Prices for April and May

3-frame nucleus with untested Italian queen	\$4.00
1 untested queen	\$1.00; 25 or more 90c each
1 tested queen	\$1.50; 25 or more, \$1.40 each

Best Service. Satisfaction Guaranteed.

JOHN W. CASH, Bogart, Ga.

LAWS FOR BEEKEEPERS

The most important activity of the Legal Aid Committee in 1923 was the completion of the book entitled "The Law Pertaining to the Honeybee," which is now in press. This work included all the court decisions of the entire English-speaking world on the status of the honeybee, and contains every cited case involving honeybees. So far as possible, it also contains every legislative enactment which has been passed anywhere in the English-speaking world covering the conditions of owners and the matter of inspection and disease eradication for the honeybee, an outline of every apiary inspection law in the United States and the various provinces and dominions of the British Empire.

This little book comprises within small space all the information beekeepers need in determining their apiary rights. It suggests the means of defense in case the bees get the owner in trouble, and the amount of authority there is for going on other people's land in following escaped swarms. The authority is given for the various statements, so that if a lawsuit develops the local lawyer, even though he may have had no former experience with bees, will have all the precedents in the case ready for presentation to the court.

This book is ready for binding and will be sold by the secretary of the League at \$3 per copy postpaid, subject to a 20 per cent discount to members of the League.

S. B. Fracker, Madison, Wis.

Pure Beeswax

A resolution was unanimously adopted by the Colorado Honey Producers' Association recently as follows:

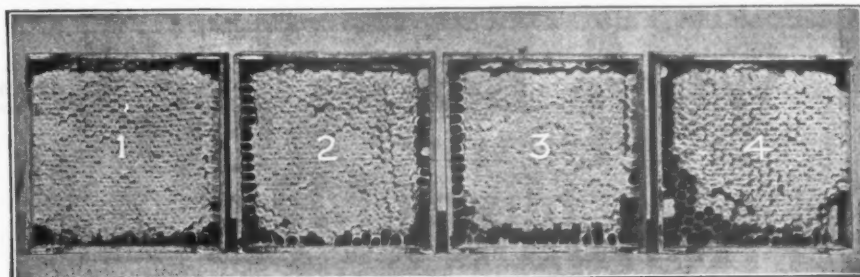
"It is the sentiment of the members assembled in convention at Denver, March 5th, that owing to the present situation on beeswax, they feel that manufacturers of bee comb foundation in this country should have due regard for the welfare of American bee culture and manufacture foundation out of **PURE American beeswax only.**"

International Congress Announcement

At the time of the International Congress of Beekeepers at Quebec, there will be held an exhibition of apiculture, beekeeping equipment and literature.

We respectfully invite every country, every review, every author, to transmit to us either a copy or a complete year of such review published in any country. The volume will not be returned unless especially requested.

Beekeeping magazines are respectfully requested to publish this notice. All correspondence should be addressed to Head of the Department of Apiculture. C. Vaillancourt, Department of Agriculture, Quebec, Canada.



Standard Comb Honey Grades

These grades (shown above), are adopted as standard by the Colorado Honey Producers' Association:

1. Extra fancy—Section well filled, comb attached on all sides; evenly capped, except outside row. Honey, combs and cappings white and not projecting beyond wood. Wood well cleaned. No section to weigh less than 12½ oz. net.
2. Fancy—Sections well filled; combs attached on all sides and evenly capped, except outside row. Honey white or very light amber; comb and cappings white to slightly off color. Comb not projecting beyond wood. Wood well cleaned. No section to weigh less than 12 oz. net.
3. Choice—Section well filled; combs firmly attached, and entirely capped, except row next to wood. Honey, comb and cappings from white to amber, but not dark. Wood well cleaned. No section to weigh less than 10 oz. net.
4. Off Grade—Sections with uncapped cells; poor finish; partly granulated; off color; Sections with more than 50 empty cells are culls and should not be marketed.

Your best profit is in sections grading 1 and 2, and the basis of this quality is the foundation. Use Dadant's Surplus Foundation—"It looks good enough to eat."—Known the world over for its purity, firmness and perfection of sheets.

DADANT & SONS, Hamilton, Illinois

Makers of Dadant's Famous Foundations,
Wired—Plain—Surplus
Sold by dealers everywhere—Write for name of nearest.

QUEENS QUEENS QUEENS

Pure three-banded leather colored ITALIAN QUEENS. Bred from a mother who has never ISSUED A SWARM. The first to BUILD UP in the spring. Gathered MORE HONEY than any colony in the apiaries, and VERY GENTLE.

A record which is seldom equaled.

	1 to 5	6 to 11	12
Untested	\$1.00 each.	\$.90 each.	\$.80 each
Select untested	1.35 each.	1.20 each.	1.00 each

Safe arrival guaranteed.

A. E. WEGER, DELPHOS, OHIO

Good Queens Pay for Themselves

Only prolific queens can give the thousands of nectar gatherers necessary to harvest a 100 per cent crop.

Make Your Colonies Strong Now with Citronelle Queens.

Queen rearing has been our life study. Satisfaction guaranteed or money refunded.

"THREE BANDED OR GOLDEN QUEENS AFTER APRIL 1"

Select Untested	Untested	Tested
1 Queen \$1.20	1 Queen \$1.00	1 Queen \$1.50
12 Queens 11.00	12 Queens 10.00	12 Queens 17.00
100 Queens 85.00	100 Queens 75.00	Breeders \$5.00 to \$25.00 each

Golden queens are reared five mile from other breeding yards. Package bees, nuclei, or full colonies quoted on request.

Book your order early. Only 10 per cent required—balance before shipment

THE CITRONELLE APIARIES, Citronelle, Ala.

Save Your Extractor Frames

Dry extractor frames infected with American foulbrood need not be destroyed. You can save them for future service with the simple, easy way of disinfecting with Be-Helth, the special sodium hypochlorite sterilizer for apiaries.

Be-Helth has 10 times greater killing effect on foulbrood infection than pure carbolic acid, yet it is absolutely non-poisonous and safe to use. It contains no such dangerous poisons as formalin, carbolic acid, etc., which might conflict with the federal laws prohibiting the use of poisons in the production of food.

Free Bulletin and full directions with each package. Send your order today for a gallon of Be-Helth.

\$3.00 per gal. \$1.25 per quart (Concentrated).

**GENERAL LABORATORIES,
Dept. 32B, Madison, Wis.**

**CHEAPER PACKAGE BEES
FOR JUNE,
BUT THE SAME SERVICE**

**JES DALTON
Bordelonville, La.**



Where Berries and Bee Hives Meet

It's strawberry time. At our house, we've been waiting for berries for shortcake, and yesterday wife bought a quart box for twenty-five cents. This seems high, and I expect I would have shopped around for a **cheaper** box. But she was a wise buyer—**every berry was perfect and there was no waste**. She has found that a **cheap** box of poor berries is often expensive—a basic fact in measuring costs that may be applied profitably to buying bee supplies.

Are your bee hives, comb-honey sections, and other bee supplies just what you expect? Do you have difficulty in making parts fit? Do you lose by breakage? If you want to forget these troubles you owe it to yourself and to your bees to give Lewis "Beeware" a trial. You will get each dollar's full measure of value, and it is this full measure that is "going home" to more and more beekeepers every year.

DADANT & SONS, Hamilton, Illinois

"BEEWARE" Distributors for Iowa, Illinois and Missouri.

BEE SUPPLIES

We make a specialty of manufacturing comb honey sections and ship millions of sections each year to all parts of the country. Samples sent free upon request. We also manufacture comb honey shipping cases and section holders in large quantities.

To complete our line we carry a full stock of the well-known "Root Quality" hives, bodies, supers, frames, Airco three and single-comb foundation and other goods. Send us your orders. We are prepared to give you the best quality and service at all times.

Write for our free illustrated catalog.

AUGUST LOTZ COMPANY BOYD, WISCONSIN



A. E. CRANDALL

"PRODUCTION BRED" ITALIAN BEES AND QUEENS

Ready June 1. All queen and drone mothers used in breeding are carefully selected. Our queen rearing methods are strictly up-to-date and we offer you a guaranteed first-class product. Our stock is winning favor as a honey-producing strain wherever it is introduced, both here and abroad.

Untested—1, \$1.00; 12, \$12.00; 50, \$47.50; 100, \$90.00.
Package bees and nuclei with queen: 2 lbs., \$4.50; 3 lbs., \$5.50; 2-frame nuclei, \$5.00; 3-frame, \$6.00.

Connecticut Valley Apiaries (where the good queens come from).
BERLIN, CONN.

Please Take Notice

Out of 33 queens sold during May, 1923, we just received the records. The poorest queen produced a surplus of 240 lbs. of honey; the highest 456 lbs., and this was from a small colony which had been queenless for several days. Eleven out of the 33 queens produced over 400 lbs. of surplus and records are as follows: 456, 453, 446, 439, 432, 427, 421, 412, 409, 409, 403. The poorest queens show that only five out of 33 queens produced less than 300 lbs. surplus; 17 queens produced between 300 and 400 lbs. These queens have been line bred since 1885.

Mr. H. E. Crowther, from Jefferson, Ohio, writes: "Your queens are sure wonders and need advertising. A queen purchased of you lately beat all the rest in a yard of 60, filling 3 deep supers. A record like the above in a season like 1923 is sure a world's record; and the queens did not have built sections to start with, and did not receive a bit of help from feeding."

Our new method of queen-rearing is sure a wonder. Untested queens, \$1. Write us for prices on large orders and breeders.

THE F. M. RUSSELL CO.,
Established 1900. Roxbury, Ohio.

STUTT'S ITALIAN QUEENS ARE SUPREME

Untested queens: 1, \$1.00; 6, \$5.50; 12, \$10.00.
Select untested: 1, \$1.25; 6, \$6.50; 12, \$12.00.
Tested: 1, \$1.50; 6, \$8.00; 12, \$15.00.
Select tested: 1, \$2.00; 6, \$11.00.
Certificate of health with each queen, and satisfaction guaranteed.

ALFRED A. STUTT,
Rt. 5, Creston, Ia.

Only One Hutzelman's Solution

FOR THE TREATMENT OF AMERICAN FOULBROOD

To make this solution properly, requires a complete knowledge of the chemistry of the ingredients used, as well as skill in mixing.

All new materials used by me in my solution are analyzed, reprocessed, and refined, so as to avoid tainting the honey or poisoning the brood.

Investigation has shown that out of forty-nine specimens of formaldehyde obtained on the open market, forty-eight contained decomposition products which are injurious to the honey and bees.

Ordinary denatured alcohol, as sold everywhere, ought never to be used in the preparation of the alcohol-formalin solution, on account of the poisons it contains that would taint the honey or kill the brood.

The solution I offer is guaranteed not to leave any trace of poison or foreign odor in the combs after drying.

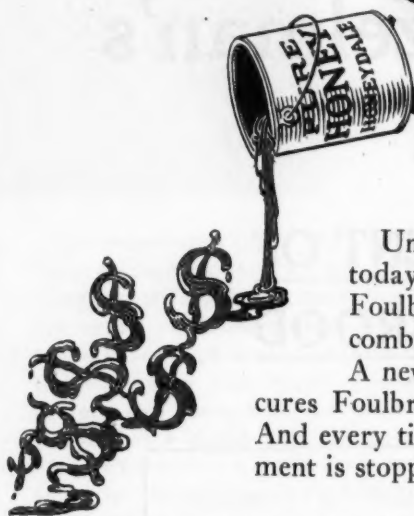
Patents pending in the United States and Canada.

For full information write

J. C. HUTZELMAN, M. D.

GLENDAL, OHIO

Stop the Leaks



SERIES ONE: HOW FOULBROOD CAN BE MORE EFFICIENTLY AND MORE CHEAPLY CURED.

Unquestionably one of the single greatest losses sustained today by producers occurs through the old way of American Foulbrood treatment, which necessitates the melting down of combs which are otherwise perfect except for contamination. A new method has been announced, however, which not only cures Foulbrood easily and efficiently, but which saves the combs. And every time a comb is saved, an expensive leak in apiary management is stopped!

B. M. Caraway, Riverton, Wyoming, orders 250 gallons. This shows the importance commercial and scientific producers place in this new method of ours. This producer is saving combs—this season—at a tremendous profit, as the following chart will show:

COST
240 gallons ordered.
\$1.50, price per gallon.
\$360.00, cost of solution

RESULTANT PROFIT
This amount will treat from 7,500 to 9,000 combs. If each comb is worth 30c, and most producers value them even higher, over \$2,200 worth of combs have been saved!!

STOP—NOW—ONE OF THE SINGLE GREATEST WASTAGE IN YOUR SYSTEM!

The coupon below will bring to you detailed description as to cost of the solution and method of procedure, together with an article by Geo. Demuth telling in detail about this new method of cure. As our aim is to help you keep bees better and more profitably, an answer will reach you promptly. Mail the following coupon today.

FREE

SERVICE COUPON—TEAR OFF AND MAIL

The A. I. Root Company of Iowa, Council Bluffs, Iowa.
Gentlemen: Please answer the following questions:
How much solution will be necessary to treat _____ combs?
What will be the cost of this amount?
What will be the cost for a tank in which to treat?
Send me detail as to procedure, and Mr. Demuth's article.

Name _____

Address _____



IMPORTANT NOTICE: This is the first of a series of plain talks, the subjects of which will be methods of eliminating the most obvious wastes that are now occurring in present beekeeping practices. The subject and wording of each talk has been recommended and approved by a large committee of practical and successful middle-west producers. Their opinions are of importance on these important subjects. Some of these men you may know: O. G. Borton, P. J. Pooley, Blackwell Honey Producers. W. A. Jenkins, H. C. Cook, N. Williamson, C. E. Kautz, C. S. Kastning, Herschel Short, J. Fitzgerald, Chas. Ranney, A. Small, A. McBride, B. M. Caraway, C. E. Carhart.

With each talk a coupon will be furnished, so that any producer may obtain detailed information regarding the particular matter discussed. We hope in this way to actively assist a large number of beekeepers to keep their bees with less effort, and for a greater profit.

THE A. I. ROOT COMPANY OF IOWA
COUNCIL BLUFFS, IOWA

Crop and Market Report

Compiled by M. G. Dadant

For our June number we have asked our reporters to answer the following questions: 1. Percentage of winter loss? 2. Condition of bees? 3. Any starvation? 4. Honey plant conditions? 5. How much will this year's crop exceed last year's?

PERCENTAGE OF LOSS

The winter's loss, compared with a year ago, is considerably less in practically all sections of the country.

In fact, the loss in most sections has only averaged from 5 to 10 per cent, there being some exceptions.

This is most noticeable in some parts of Michigan and most especially in many sections of Colorado, where the loss has been heavy.

Other sections where the loss has been somewhat larger than ordinary are South Dakota, Nebraska and, of course, California, where the shortage of stores last fall caused a very great loss of bees from starvation throughout the fall, winter and early spring.

CONDITION OF BEES

Generally speaking, condition of bees can be considered normal. There has, however, since our last report, been some very adverse weather, and this has held back the bees considerably, and more noticeably it has held back any chances for storage of any quantities of honey from early crops like dandelion, fruit blossom, etc. This means that the bees perhaps have not built up as strongly as possible and most assuredly have not gathered as much honey as they might have otherwise.

In California, again, especially southern California, the bees were in such weak condition coming out of winter quarters that they were not able to take advantage of the orange flow when it came, and as a consequence there is considerably less orange honey this year to place upon the market than there was a year ago. In fact, bees have had to build up on orange blossoms rather than gather a large surplus from them.

The main impression upon the writer from reports coming in, is that the beekeepers are very apathetic. They are inclined to discount any prospects of honey flow, etc., from the fact that the weather is very backward. This is noticeable as compared to a year ago, when many sections were much encouraged and looked for an extremely good yield.

STARVATION

As suggested by the paragraph above, the weather has been very inclement and it has meant that bees have not gathered much from the early blossoms. This being the case, and also combined with the fact that they did not go into winter quarters in many instances with as much stores as they have needed, has tended to considerable percentage of starvation this spring. This is most noticeable, of course, with the smaller beekeeper who does not take proper care of his bees, but it is remarkable to notice among reporters how many beekeepers there were who had lost a few colonies of bees from starvation and still expected to lose a few more.

Practically every state reported some starvation and nearly all of the better beekeepers were having to feed their bees large quantities of sugar syrup in order not to have a break in brood rearing.

In many cases, as a result, colonies are practically destitute of honey and are depending entirely upon what is fed them from day to day for their living and brood rearing. Colonies, however, in such condition, if fed sufficiently, usually build up rapidly and strong.

HONEY PLANT CONDITIONS

Of course, honey plants are backward in practically all sections of the country. The backward weather does not seem to be confined to any particular location, but extends from California to the Atlantic Coast and from the Gulf of Mexico to the northern parts of Canada.

Again reports coming in were compared to those of a year ago and they show conclusively that honey plant conditions are much better than they were in 1923.

Some reports are to the effect that honey plants are fair, a few reports, such as Missouri, some parts of Illinois, parts of Wisconsin and Minnesota, etc., show that the rainfall in some instances has been deficient and that much rain will be necessary in order to bring the plants in best condition for honey yielding. In many instances, however, there seems to be a fairly good scattering of clover on the ground and the opinion of the reporters is that if we have proper weather from now on until July 1st there should be considerable honey stored.

In Texas, where conditions were extremely flattering a month ago, the weather also has been backward. There has been much cool, rainy weather, which has tended to a growth of vegetation rather than to a profusion of bloom, and from this fact possibly the honey yield will not be quite as heavy as at first expected.

In looking over resume of reports sent in of honey plant conditions from all states, we find one report as low as 75 per cent of last year, one 80 per cent, several reporting conditions fair, two or three late, but the great majority reporting conditions from 100 per cent to 150 per cent of last year, and many stating that the conditions are either good or excellent.

CROP EXPECTED

The apathy of beekeepers is well illustrated by the answer to this question. Practically every reporter declined to give any answer, stating that this could not be foretold ahead.

There were, however, a few reporters who gave an idea of what they hoped conditions would be and remarkably enough these reports came from two or three states. It would appear from such suggestions that Indiana, Ohio, Kansas, parts of Illinois and Iowa, at least expect a much better flow than last year.

Several other states in the Central West believe that if the rainfall is sufficient they also will get much more surplus honey than in 1923.

Georgia and Florida have already had their first flow and report that it will be considerably in excess of 1923, with prospects excellent for the balance of the year.

SUMMARY

All in all more than any year lately prospects for a crop seem to hinge on what the weather will be between now and the time the major flow starts in.

With favorable weather in all sections and ample rainfall, it looks like we would be due for a bumper crop in most sections in 1924. This applies especially to the white clover regions. California, of course, will have a short crop and Montana will probably be considerably short of what it was in 1923 when they had really a bumper crop.

The shortage of stores of bees and the growing strength of colonies, part of it from heavy feeding, would indicate that with favorable conditions we might look for something like a possibility of excessive swarming should the weather turn favorable and the white clover yield heavily once it opens up.

It seems hardly possible, however, that we would have a crop failure in view of the plentiful rains in most sections, and the fact that white clover in the Central West and East seems to be fairly abundant.

It is to be hoped that the rank and file of beekeepers are at least prepared for a normal crop by having sufficient storage room on hand to protect themselves against a crowding of the bees when the crop does start.

Practically all old honey is cleaned up, although a few cars are still offering. The price, however, asked for these is in the neighborhood of 9c to 9½c per pound f. o. b. shipping point. Comb honey seems to be practically off of the market and the darker grades are extremely well disposed of.

CLASSIFIED DEPARTMENT

Advertisements in this department will be inserted for 5 cents per word, with no discounts. No classified advertisements accepted for less than 35 cents. Count each initial or number as one word.

Copy for this department must reach us not later than the 15th of each month preceding date of issue. If intended for classified department it should be so stated when advertisement is sent.

As a measure of protection to our readers, we require references of all new advertisers. To save time, please send the name of your bank and other references with your copy.

BEEES AND QUEENS

HONEY IN PAIRS—

Atwater, Meridian, Idaho.

FOR CHOICE COLONIES of Italian bees write to the Knobby Pine Apiary, Unionville, Mo., for prices and information. Best of stock; price fits your purse.

Fred H. Drury, Unionville, Mo.

WAIBEL'S pure three-banded Italian queens. Write for prices now.

J. H. Waibel, Kawkawlin, Mich.

PURE ITALIAN QUEENS—Untested, \$1.00; tested, \$1.25; 2-lb. package, \$2.75. Add price of queen wanted. Safe arrival guaranteed after May 10. Write for prices on colonies.

Birdie W. Hartle,

924 Pleasant St., Reynoldsville, Pa.

BRIGHT ITALIAN QUEENS—1, \$1.00; 12, \$10.00; 100, \$75.00. Write for prices on package bees.

T. J. Talley,
Rt. 3, Greenville, Ala.

IF YOU WANT good, bright Italian queens by return mail, send your orders for queens to us: \$1.00 each, \$11.00 per dozen; \$75.00 per 100. Safe arrival, pure mating and reasonable satisfaction guaranteed in United States and Canada. One pound bees with queen, \$3; 2 lbs. bees with queen, \$5.00. We pay delivery charges up to 1,000 miles and guarantee safe arrival in United States and Canada. No disease in our apiaries.

Graydon Bros.,
Rt. 4, Greenville, Ala.

FOR SALE—20 colonies of bees in 10-frame Langstroth hives, \$7.85 per colony at bee yard. Reason for selling, too many. All hives in good condition, none rotted.

Valentine Becker, Berdan, Ill.

BRIGHT ITALIAN QUEENS and BEES—Queens, \$1.00 each. Two-frame nuclei, \$4.00 each with queen. Eight-frame super with bees, queen and brood, \$8.00 each. Free from disease.

P. B. Skinner, Greenville, Ala.

FOR SALE—Three-banded Italian queens. Untested, 1 to 11, \$1.00 each; 12 to 49, 85c each; 50 to 100, 75c each. Tested, \$2.00 each. Satisfaction guaranteed. Ready to ship June 1 to June 10.

R. B. Grout, Jamaica, Vt.

GOLDEN ITALIAN QUEENS, untested, \$1.00; 6 for \$5.40; 12 or more, 80c each. Tested, \$1.50. Select tested, \$2.50. No disease good queens. Safe arrival and satisfaction guaranteed.

D. T. Gaster,
Rt. 2, Randleman, N. Car.

FOR SALE—Three-band Italian queens after May 20th. Untested queens, \$1.25 each; 6, \$7.00; 12, \$13.50. Tested queens, \$2.50 each.

Robt. Spicer, Wharton, N. J.

PACKAGE BEES—Circular free.

Van's Honey Farms, Hebron, Indiana.

GOLDEN ITALIAN QUEENS—June 1 to November 1, untested, \$1.00 each; 6, \$5.50; 12, \$9.00; 3-frame nuclei, \$4.00 each.

Wayne Apiaries, Inc., Jesup, Ga.

\$70.00 per hundred we are asking for our June queens. Let our circular tell you more of them.

R. V. Stearns, Brady, Texas.

MAYEUX'S non-swarming queens. Three-banded; 2-frame nuclei with an untested queen, \$2.75 each; 10 to 20; \$2.65 each; 25 to 100, \$2.50 each. White clover seed, 1 to 10 pounds, 70c per pound; 25 to 100 pounds, 60c per pound. For larger quantities write or wire for prices.

L. C. Mayeux Hamburg, La.

GET THE BEST—Package bees, 1924 delivery, ready April 20. Bright three-banded Italian bees and queens. Two-pound packages with untested queens, \$4.50 single package; twenty-five or more, \$4.25. Tested queens, single \$1.50 each; twenty-five or more, \$1.25. Untested queens, \$1.00 each, or \$80.00 per hundred. Also a limited amount of Hybrid bees. Two-pound packages with bright three-banded Italian queens at \$3.50; twenty-five or more, \$3.25. Three hundred two-frame nucleus at \$3.50 each, with untested queens same as above. Terms, 10 per cent with order, balance date of shipment. Safe arrival guaranteed, no disease.

H. M. Rains, Gause, Texas.

FINEST ITALIAN QUEENS—\$1.00 each. Booking orders.

Wm. R. Stephens, Wingate, Ind.

"SHE-SUITS-ME" three-banded Italian queens, untested, \$1.00 each, after June 1; in May, \$2.00 each. If you wish 50 or more, write for price list. Tested queens, \$3.00. Nuclei and packages of highest quality at reasonable prices.

Allen Latham, Norwichtown, Conn.

GOLDEN ITALIAN QUEENS for 1924. The big, bright, hustling kind. Satisfied customers all over the U. S. Untested \$1.00 each, 6 for \$5.00, 12 for \$10, 100 for \$75.00; tested, \$1.75. A few two-frame nucleus at \$4.50, with queen.

E. F. Day, Honoraville, Ala.

GOLDEN Italian Queens. Tested queens, \$2 each; untested queens \$1 each; when I have them hybrids 3 for \$1. Satisfaction in all cases.

J. F. Michael,
Rt. 1, Winchester Ind.

THREE-BANDED ITALIAN QUEENS—Select untested \$1.00 each; \$10.00 per dozen. Two-pound package with queen, \$3.50; 3-pound package with queen, \$4.75. Safe arrival and satisfaction guaranteed.

W. T. Perdue & Sons, Fort Deposit, Ala.

CAUCASIAN QUEENS—Untested, \$1.50, tested, \$2.50. Bees, 3 pounds without queen, \$4.50. Shipment provided for with candy made from invert sugar. Bees not shipped on combs. Safe delivery guaranteed.

H. Rauchfuss, Englewood, Colo.

WARRANTED ITALIAN QUEENS—Mated pure, at \$1.25 each, mailed in sure introducing cages that never fail if colony is queenless. No honey used in candy.

Daniel Danielsen, Brush, Colo.

QUEENS—Queens by return mail, 3-banded, large, bright, hustlers. Selected untested, 1, 80c; 12, \$8.00; 100, \$60.00. Selected tested, 1, \$1.25; 12, \$12.00. No disease; ship only the best; good service and satisfaction guaranteed.

W. C. Smith & Co., Calhoun, Ala.

HIGH GRADE QUEENS—at utility prices. Write for circular.

R. V. Stearns, Brady, Texas.

SIMMONS QUEENS and NUCLEI—Shipped promptly. Satisfaction guaranteed.

Fairmount Apiary, Livingston, N. Y.

GOLDEN ITALIAN QUEENS—They are reared right from good stock and the price is right. 1, \$1.05; 6, \$5.50; 12 or more 80c each. Tested \$2.00 each. After July 1, 1, \$1.00; 6, \$5.25; 12 or more 75c each. Tested, \$1.75 each. Safe arrival insured. Certificate of State Inspector with each shipment.

Hazel V. Bonkemeyer,
Rt. 2, Randleman, N. C.

TRY PETERMAN'S QUEENS—I select out and sell only perfect, large, thrifty layers, killing all others. I figure this pays for repeat orders. They are bred from choice Jay Smith breeders by a thoroughly experienced breeder who is absolutely honest and reliable. Circular free. Reduced prices after June 30: 1, \$1.00; 6, \$5.50; 25, 90c each; 100, 80c each.

H. Peterman, Lathrop, Calif.

CARNIOLAN QUEENS—Bred from imported mothers of pure Alpine stock. Lockhart's best select breeding strain is their support. No better combination could be arranged. Prices, 1 select untested, \$1.00; 6, 90c each; 12, 80c each, and 25 or more, 75c each. Circular free.

M. G. Ward, Lathrop, Calif.

MY 5-BANDED GOLDEN QUEENS will be ready April 1. One queen, \$1.00; six queens, \$5.50; twelve queens, \$10.00.

W. W. Talley, Greenville, Ala., Rt. 4.

ON RECEIPT OF ORDER—Our nice strain of three-banded bees and queens, with government health certificate. One standard frame nuclei with 2 lbs. of bees and a good selected untested queen, \$2.95 each; 5 packages \$14.25; 10 packages, \$25.00. Each additional frame brood add 50c. If wanted a selected tested queen add 75c. I guarantee safe delivery. Address, with remittance,

C. A. Mayeux, Hamburg, La.

BEEES BY THE POUND; also Queens—Booking orders now. Free circular gives prices, etc. See larger ad elsewhere. Ault Bee Co. (Successors to Nueces County Apiaries), San Antonio, Tex. E. B. Ault, Prop.

SEE my display ad., page 299.

Jes Dalton, Bordelonville, La.

GOLDEN ITALIAN QUEENS—Producing bees solid yellow to tip from record honey gathering breeders. Package bees and nuclei. Circular 1924 ready.

Dr. White Bee Company, Sandia, Tex.

FOR SALE—Italian bees and queens. One-pound package with untested queen, \$2.50; 2-lb. package with untested queen, \$3.50. Queens, untested, up to May 15, \$1.00 each.

O. P. Hendrix & Son, West Point, Miss.

GOLDEN ITALIAN QUEENS, producing bees solid yellow to tip. Selected untested, \$1.00; tested, \$2.00. Disease free; safe arrival and satisfaction guaranteed.

H. G. Karns, Victoria, Va.

FOR SALE—Golden Italian queens. Untested, \$1.00; 6 for \$5.50; 12 or more, 80c each; tested, \$1.50; select tested, \$2.50 each. Write for prices on large quantity. No disease of any kind. Safe arrival and satisfaction guaranteed.

Sam Hinshaw, Randleman, N. C.

BUY your package bees and nuclei, with queens introduced and avoid loss. Best pure mated Italian queens guaranteed. State inspected. No disease. References.

A. O. Smith, Mt. Vernon, Ind.

GOLDEN THREE-BANDED and Carniolan queens. Tested, \$1.00; untested, 75c each. Bees in 1-pound package, \$1.50; 2 pounds, \$2.50; 3 pounds, \$3.25. Safe delivery guaranteed.

C. B. Bankston,
Box 65, Buffalo, Leon Co., Texas.

BREEDER of fine Italian queens.

C. B. Saunders' Apiaries, Merom, Ind.

FULL COLONIES and guaranteed Italian queens. A limited number for sale this spring. Write for prices.

Matthew Apiaries, Virginia, Ill.

PRICES RIGHT—Pinard's queens and package bees. Quality, satisfaction guaranteed. Young, laying, untested queens \$1.25. Two-pound package bees, \$3.50. For larger lots write. Circular free.

A. J. Pinard, Morgan Hill, Calif.

THREE-BANDED, light colored only. One-frame nuclei with untested queen, \$2.00 each; in lots of 10 or more, \$1.90 each. Additional frame of brood or pound of bees, 60c extra to each package. The above is for immediate shipment.

Central Louisiana Apiaries,
Oscar Mayeux, Prop., Hamburg, La.

CAN SPARE in June, July, several colonies best Italians, wired combs built on full sheets foundation, 8 or 10 frames Langstroth hives. Also 5 second-hand Buckeye hives in good condition. Reasonable. Guaranteed free from disease.

S. Cushman, 6 East Lake St., Chicago, Ill.

ITALIAN QUEENS of quality, \$1.00 each, \$11.00 for 12.

W. E. Buckner, Mt. Vernon, Ga.

I AM all booked for this month for Caucasian queens. Try my Italians at 50 cents by return mail.

Peter Schaffhauser, Havelock, N. C.

BRIGHT Three-band Italian Queens—\$1.00 each, 6 or more 75 cents. Two and three-frame nuclei.

Tupelo Apiaries,
J. L. Morgan, Apalachicola, Fla.

FOR SALE—Three-banded Italian queens and bees ready for June 5 delivery. Price: 1 untested queen, 85 cents each. One 2-pound package with queen, \$3.00 each. Health certificate with each shipment. Address to John St. Romain, Marksville, La.

MERRILL'S QUEENS—\$1.00 each.
R. E. Merrill, Muncy, Pa.

FOR SALE—175 colonies of bees. Nearly all in three-story hives prepared for the clover honey flow in June, together with all modern equipment, including excluders, bee escapes, chaff trays, Peterson capping melter, 4-frame power extractor and engine; extra supers, etc. The above bees have for their use 100 Buckeye hives, 100 two-story standard 10-frame Root hives, 150 machine-made 10-frame supers, over 100 8-frame Root made supers with covers and bottoms, and hundreds of Root made shallow supers for comb or extracted honey, as desired. All this for \$2,000, together with all honey in the hives. These bees are in northern Ohio. Address H C. Lane, West Berne, Albany Co., New York.

FOR SALE—3 10-frame colonies, 3 8-frame colonies of bees, 15 empty supers; \$50 if taken at once. Bees in Disco, Ill. Address, J. Constance Rice, Rt. 3, Dallas City, Illinois.

PACKAGE BEES AND QUEENS—Ready now to fill your orders for 2-lb. package bees, with select untested Italian queen, \$3.50; 3-lb. pkgs. with queen, \$4.50. Safe delivery and satisfaction guaranteed.
Clyde Cobb, Belleville, Ark.

TO MAKE ROOM for a large shipment of breeders we have coming from Italy, we are sacrificing some of our best breeding queens. They are daughters of breeder from Italy but are a shade yellow in color, owing to climate. They are easily worth \$25 to \$50. Price \$5.00 each. Untested queens bred from breeders from Italy, they will stand the test again anywhere; 1 to 5, \$1.00; 5 to 11, 80c. Write for prices in larger lots. The V. R. Thagard Co., Greenville, Ala.

NORTHERN BEES PAY—Fresh, active bees, less express, 2 lbs. with select queen on frame of foundation, \$5.75. May delivery. Scott Apiaries, La Grange, Ind.

BRIGHT three-banded Italian queens. Prices before July 1, one \$1.25; six, \$6.50; twelve, \$12.00. Prices after July 1, one, \$1.00; six, \$5.00; twelve \$9.00. I guarantee safe arrival, pure mating and satisfaction.
J. F. Diemer, Liberty, Missouri.

FOR SALE—Three-band Italian bees and queens. Two-pound package bees with select untested queens, \$4.25; one select untested queen, \$1.00; one selected tested queen, \$1.50. J. Allen, Catherine, Ala.

EUREKA QUEENS, highly disease resisting, American bred, copper colored Italians. Untested, July, one, \$1.25; six, \$6.50; twelve, \$12. Tested, \$15.00.
Eureka Apiaries, A. C. F. Bartz, Mgr. Jim Falls, Wis.

PACKAGE BEES & QUEENS—Italians or Carniolans. I can save you express charges. See larger advertisement for prices. J. E. Wing, San Jose, Calif.

HARDY ITALIAN QUEENS—\$1.00 each.
W. G. Lauver, Middletown, Pa.

GOLDEN and three-band queens reared in separate yards; booking orders for 1924. Untested, one, \$1.25; doz., \$11.50. Safe arrival guaranteed in U. S. and Canada. Tillery Bros., R. 5, Greenville, Ala.

FOR SALE—Will sell from one to 75 colonies Italian bees, 10-frame hives, metal covers and one super each. Stock from the best breeders in the country, on wired frames and full sheets foundation. Guaranteed free from disease. Will ship any time buyer wishes in spring. Reason for selling, have more than I can keep in one yard. Price \$10.00 f. o. b.
Bert Gander, Bayard, Iowa.

NORTH CAROLINA bred Italian queens. I am booking orders now for my Root and Miller strain of three-banded Italian queens. They are gentle and good honey gatherers. From May 1st until July 1st. Untested, \$1.25 each, or \$12.50 per dozen. Tested \$1.75 each, and selected tested \$2.75. Safe arrival and satisfaction guaranteed.
L. Parker, Benson, N. C., Rt. 2.

FOR SALE

FOR SALE—White and amber extracted honey. Write for prices. State quantity wanted. Dadant & Sons, Hamilton, Illinois.

HONEY IN PAILS—
Atwater, Meridian, Idaho.

FOR SALE—Good second-hand 60-lb cans, 2 cans to a case, boxed, at 60c per case, f. o. b. Cincinnati. Terms cash.
C. H. W. Weber & Co., 2163 Central Ave., Cincinnati, Ohio.

FOR SALE—Second-hand 5-gallon cans. Only good cans offered. Two cans each case. Per 10 cases, \$6.50; per 25 cases, \$15.00. Ask for prices on quantity lot.
A. I. Root Co., 230 W. Huron St., Chicago, Ill.

HONEY AND BEESWAX

FOR SALE—White honey in 60-lb. cans; also Porto Rican in 50-gal. barrels. Samples and prices on request.
A. I. Root Co.,
16-18 Jay St, New York, N. Y.

HONEY IN PAILS—
Atwater, Meridian, Idaho.

FOR SALE—Comb and extracted white clover honey. Extracted in 60-lb. cans, 5 and 10-lb. pails. Prices given on request. Sample 15c. F. W. Summerfield, Waterville, Ohio.

BEEWAX WANTED—We need large quantities of beeswax and are paying good prices now. Ship to us at Hamilton, Ill., or Keokuk, Iowa, or drop us a card and we will quote f. o. b. here or your own station, as you may desire.
Dadant & Sons, Hamilton, Ill.

HONEY FOR SALE—In 60-lb. tins; white clover, 18c, for immediate shipment from New York
Hoffman & Hauck, Woodhaven, N. Y.

ROBINSON'S comb foundation will please the bees, and the price will please the beekeeper. Wax worked at lowest rates.
E. S. Robinson, Mayville, N. Y.,
Chau. County.

FOR SALE—120 acres irrigated unimproved land in Wyoming, \$30 per acre. Will grow 500 tons alfalfa per year. Easy terms. Would accept some bees in 10-frames or larger equipment on this.
Asher F. Dillard, Walthill, Neb.

FOR SALE—Exceptionally fine honey, flashy, heavy body, in 60's, 12½c. Send orders or write for samples. Quality guaranteed.
The A. I. Root Co., Council Bluffs, Iowa.

HONEY—New crop extracted, finest thick, Florida white tupelo. Several tons in new barrels. Thoroughly ripened on hives, guaranteed not to granulate or ferment.
M. L. Nisbet & Bro., Bainbridge, Ga.

FOR SALE—Our own crop white clover and amber fall honey in barrels and cans; also white alfalfa in cans. State quantity wanted and we will quote prices. Samples on request.
Dadant & Sons, Hamilton, Ill.

SUPPLIES

TWO HUNDRED 10-lb. lithographed pails of white clover honey. Write for prices.
W. Ritter, Genoa, Ill.

SOUTHWESTERN distributors for Robinson's comb foundation. Send for price list.
Holloway Bros., Marietta, Okla.

SPECIAL PRICES—We are offering at specially low prices some very high grade material in shipping cases, frames, hives and miscellaneous which represent items we no longer carry regularly in stock or which have to be closed out to make room for new stock specially equipped to take Dadant's Wired Foundation. If interested, write for list; we can save you money.
Dadant & Sons, Hamilton, Ill.

HAVE YOU any Bee Journals or bee books published previous to 1900 you wish to dispose of? If so send us a list.
American Bee Journal, Hamilton, Ill.

CONNECTICUT and Rhode Island headquarters for Root's Beekeepers' supplies.
A. W. Yates, 3 Chapman St., Hartford, Conn.

WESTERN BEEKEEPERS—We can demonstrate that you can save money on buying bee supplies of best quality. Write for our latest price list.
The Colorado Honey Producers' Association, Denver, Colo.

ATTRACTIVE LOW PRICES—Write us for list of odds and ends, shipping cases, hives, etc., first grade, priced to save you money.
Dadant & Sons, Hamilton, Ill.

REXFORD Push-in Comb Introducing Cage. Improved so queen is introduced automatically. Bees let themselves in with the queen after a day or two, one at a time, through an excluder. In this way they will not harm her, but go in and out and begin to feed her, and she is practically introduced, while safe in the cage. A day or two later she is released. 35 cents each; 3, \$1.00.
O. S. Rexford, Winsted, Conn.

GALVANIZED Bee Hive Covers—We can furnish promptly, made to your specifications from galvanized sheets of our own manufacture. Send us your inquiry.
The New Delphos Mfg. Co., Delphos, Ohio.

FOR SALE—Drawn combs in standard 10-frame Root bodies. Suitable for either brood or super work. Absolutely no disease.
Porter C. Ward, Elkton, Ky.

MISCELLANEOUS

TO EXCHANGE—No. 6 Remington typewriter, value \$25, for package bees.
A. B. Silliman, Boone, Iowa.

HONEY IN PAILS—
Atwater, Meridian, Idaho.

BEES AND HONEY—George W. York, editor, Spokane, Wash. Sample free.

GLEANINGS IN BEE CULTURE, published at Medina Ohio, is the most carefully edited bee journal in the world. Its editor-in-chief is Geo. S. Demuth. Its field editor is E. R. Root. Ask for sample copy.

WE HAVE NOW ON HAND, from Paris, a number of copies of the excellent work of Perret-Maisonneuve, in French, entitled "L'Apiculture Intensive & L'Elevage des Reines." The first shipment was delayed over two months. The price of this very progressive work is \$1.50 by mail, prepaid.
American Bee Journal.

WILL EXCHANGE Singer sewing machine for amber honey.
Harris Merchantile Co., Jackson, Tenn.

THE BEE WORLD—The leading bee journal in Britain, and the only international bee review in existence. It is read, re-read and treasured. Will it not appeal to you? Specimen copy free from the publishers, The Apis Club, Benson, Oxon, England. Send us a postcard today. It is well worth your little trouble.

THE DADANT SYSTEM IN ITALIAN—The "Dadant System of Beekeeping" is now published in Italian, "Il Sistema d'Apicoltura Dadant." Send orders to the American Bee Journal. Price \$1.00.

THE "Archiv fur Bienenkunde" is a valuable scientific publication. "It merits the appreciation of all beekeepers acquainted with the German language," says the Bee World (January, 1923). "The Archiv fur Bienenkunde, now in its fifth volume, is of as high grade as any bee journal which comes from abroad, dealing especially with the scientific aspects of beekeeping," says Gleanings in Bee Culture (February, 1923). Annual subscription, \$1. Specimen copy free. Publisher, Theodor Fisher, Freiburg im Breisgau, Kirchstrasse 31, Germany.

WANTED

HONEY—State price and send sample.
Paul Thomas, 1157 Third St., Milwaukee, Wis.

WANTED—Car or less lots of clover honey; mail sample and quote lowest cash price.
A. W. Smith, Birmingham, Mich.

WANTED—Shipments of old comb and cappings for rendering. We pay the highest cash and trade prices, charging but 5c a pound for wax rendering.
Fred W. Muth Co.,
204 Walnut St., Cincinnati, Ohio.

COMB HONEY WANTED—
J. Gakler, Rt. 1, Memphis, Tenn.

Melting Granulated Honey in Incubator

Hauck Brothers, of Quincy, Ill., use an incubator made over for the purpose of melting granulated honey. They removed the bottom from a 300-egg size machine and added extra room below in which the water tank was placed. Over this tank they placed slats one inch above the tank. This provided room for melting about 500 pounds of honey at one time. It is easy to control the temperature, as is necessary when hatching eggs. At 110 degrees it takes two or three days to melt the honey after it is fully candied.

The Best

"L'Apicoltura Italiana" gives a joke which is credited to the United States. It is not any the worse for having crossed the ocean twice:

Four merchants in the same street, in Chicago, handled honey. One of them advertised it as "The best honey in Chicago." The next man improved upon this and advertised his honey as "The best honey in the United States." The third man, not to be outdone, put up the sign "The best honey in the world." The last man was more modest, he just advertised "The best honey on this street."



HIGH GRADE ITALIAN QUEENS

By Return Mail

Select untested, 1 to 9, \$1 each; 10 or more, 90c each. Select tested, after June 20, \$2 each.

Frank Bornhoffer

Tobasco Ohio.

(Formerly of Mt. Washington, Ohio.)

QUEENS

One queen, \$1.00.

25 queens, 90 cents each.

100 queens, 80 cents each.

Safe arrival and satisfaction guaranteed. Leather colored three-band Italian queens only. Queens are bred by a breeder of 28 years' experience, and mated in 3-frame nuclei which, I think, is as near Nature's way as we can have them reared.

W. H. MOSES, Lane City, Texas

Mott's Northern Bred Italian Queens

Select untested, \$1.25 till June 1; \$1.00 each thereafter. Select guaranteed pure mated, \$1.25. Select tested, \$2.00. Virgins, 50c. 172 miles east of Windsor, Ont. Save 48 hours in transit from the far South. Satisfaction and safe arrival guaranteed.

E. E. MOTT,
Glenwood, Michigan.

Early Order Discounts

EVERYONE, including the beekeeper, is looking for a way to save money—this is one of them.

SECTIONS, SECTION HOLDERS, SEPARATORS, HOFFMAN BROOD FRAMES—ALL AT LIBERAL DISCOUNTS. Write in for quotations on the supplies you need for the 1924 season.

Orders forwarded immediately on receipt. Newly manufactured stock on hand with more in process.

CHARLES MONDENG

146 Newton Ave. N. and 159 Cedar Lake Road

MINNEAPOLIS, MINN.



MANUFACTURERS OF
"BLOSSOM-SWEET"
AND
BADGER BRAND
5 and 10 lb. Honey Pails.

We specialize in 5 and 10 lb. round pails and 60 lb. square cans. Plain and Lithographed cans of all descriptions.

WILKE-S-BARRE CAN CO.

ESTABLISHED 1856

WILKE-S-BARRE, PENNA.



GRAY CARNIOLANS

Prices of Queens:

1 untested, \$1.50; 2 or more \$1.25 each. Select tested, \$2.00; 2 or more, \$1.50 each.

Finest of stock, domestic or imported strains. WRITE for free 8-page circular.

W. A. HOLMBERG, Denair, Calif.

JUNE AND JULY

is the time to try our high grade Italian Queens. Guaranteed to satisfy or your money back.

\$1.00 each, \$10.00 per dozen, \$80.00 per hundred.

You will be pleased with our stock.

J. J. SCOTT, Crowville, La.



**Pack Your Honey
in Glass**

"DIAMOND I" fluted Honey Jars make the appetizing quality of your Honey stand out.

The prospective customer sees the product itself. His eye is not stopped and diverted by the container.

Most Beekeepers' Supply Houses carry "Diamond I" Honey Jars in stock and can supply you promptly with either 1/2 lb. or 1 lb. Jars, complete with tight fitting caps packed in 2 dozen Corrugated Reshipping Cases.

If you are unable to secure these jars from your local distributor, write us direct.

Illinois Glass Company
ALTON, ILLINOIS

OHIO VALLEY QUEENS

FOR QUALITY

FOR SERVICE

Our aim and wish is to please you, and our best advertisement is to fill your order, large or small, with queens of the best honey gathering strain it is possible to rear.

PRICES OF OUR QUEENS

Untested, 1 to 12\$1.00 each Select tested, after June 15...\$1.75 each
Select untested, 1 to 12\$1.25 each Virgins (not mated)50 each

FRAMES

We have just taken the sale of the Russell patent frame, being standard in size, self-spacing and fits all standard hives. We are sure you will like it, and offer you the frame at these special prices: 25 for \$2.00; 50 for \$3.25; 100 for \$5.75.

OHIO VALLEY BEE CO. CATLETTSBURG, KY.

Every year the practical information in each past volume of the American Bee Journal becomes more useful.

25c a year keeps your Journals from the waste basket

We have secured a stock of very durable, laced, marble-board binders in attractive colors. Each binder will hold three volumes of the Journal. Bound in this way your Journals slip into the library shelves like regular books and are thus permanently saved.

These are available to our subscribers for the low price of 75c each.

AMERICAN BEE JOURNAL,
Hamilton, Ill.

32 Years Ago

Commercial queen rearing was in its infancy. The shipping of bees in combless packages was unheard of.

Our years as specialist in this business date back to 1892. We commenced almost at the beginning and have grown with the industry.

Not only have we grown in size, but the fine qualities of our strain of bees and our good service have improved with the passing years.

Today we offer you service that really pleases and a strain of bees that is **THRIFTY**. We offer you the result of over a quarter of a century's work and study among the bees.

If you have not tried our thrifty bees and good service, may we not send you our descriptive literature?

UNTESTED QUEENS: 1, \$1.00; 12 to 25, 85c; 25 to 50, 80c. Larger quantities and other grades upon application.

POUND BEES by express and parcel post at attractive prices.

W. J. FOREHAND & SONS
Ft. Deposit, Ala.

GOLDEN QUEENS

Untested, \$1.00 each, or six for \$5.00; 100 untested queens, \$75.00. Tested queens, \$2.00 each.

I guarantee safe arrival, satisfaction, and ship nothing but the best.

G. A. TAYLOR
Lock Box, Luverne, Ala.

WHO CARES?

We don't care what you are accustomed to pay for the queens you have purchased. Price alone adds nothing to the value of a queen. You want to get the very best queens it is possible to produce. We are in the field to meet this demand, and AT A PRICE THAT IS FAIR.

In point of years in the business many have us beat. TEN YEARS OF QUEEN REARING SERVICE TO THE AMERICAN BEEKEEPERS IN THE QUEEN CENTER OF THE WORLD. has gained for us experience and a knowledge of the art, probably enjoyed by few.

With the rush of the package season over, we can divert our every attention to our queen business, which is increasing by leaps and bounds. Our capacity is now 1,200 queens per month. Still we are hard pressed to get all of them out on schedule. NOW WHO CARES? "The hundreds who buy our queens."

"WE CARE FOR YOUR QUEEN WANTS"

Untested. \$1.00 each. \$11.00 dozen. \$75.00 per hundred.

Select untested. \$1.20. \$13.00 dozen. Tested. \$1.50. Breeders. \$5.00.

For delivery after July 1. discount 10 per cent.

Nothing but the best is good enough for our customers. We guarantee: Pure mating. Absolutely no disease. Safe arrival. and satisfactory service after proper introduction.

Do you care for QUALITY SERVICE and A SQUARE DEAL? Then address your orders to

JENSEN'S APIARIES, Crawford, Mississippi

HONEY LABELS WITH A BUYING APPEAL

Honey labels justly worth their widespread reputation. Skillful designing, attractive colors, and an exact knowledge of beekeepers' needs give us the three qualities most needed to produce just the labels you will want. We can fill your most exacting requirements. Send for free sample selection.



No. 117.—A handsome label in 6 fine colors for those who wish the best, costing about one-half cent each in quantity lots.

Everything in printing for the beekeeper, price lists, queen and package catalogs, stationery, store window placards, honey leaflets, stickers, advertisements for your newspapers, anything you may need. Place your requirement early. Samples and information on request.

AMERICAN BEE JOURNAL, HAMILTON, ILLINOIS

BUSY JUNE DAYS SUPPLIES WANTED QUICK

We keep a complete stock of ROOT QUALITY BEE SUPPLIES. We are equipped to take care of your orders right. Send your orders to us. WE WILL NOT DISAPPOINT YOU.

A. I. ROOT COMPANY OF CHICAGO

224-230 W. Huron St. Chicago, Illinois

Queens—Package Bees. Queens—Three-Banded Only

Mr. Beekeeper: Now is the time to place your order for the season's needs. I have the stock, equipment and experience necessary to produce queens and bees. My queens are reared by men who know how. Each and every queen or package positively guaranteed to reach you in perfect condition and to give perfect satisfaction. You are the judge and jury. Ask your beekeeping friends what my strain of bees has done for them. Place your order now and be on time. One-fourth down, balance before shipping date.

I enclose health certificate with each shipment.

Prices of Queens				Pound Packages, with Select Untested queens	
	1	6	12	100	By Express.
Untested	\$.90	\$ 5.25	\$ 9.50	\$70.00	
Select untested	1.00	5.75	10.50	75.00	2-lb. pkgs., 1 to 12, \$4.25 ea.; 12 to 50, \$4.00 ea.
Tested	2.00	10.00	20.00	150.00	3-lb. pkgs., 1 to 12, \$5.25 ea.; 12 to 50, \$5.00 ea.

Order direct from this ad.

THE FARMER APIARIES, Ramer, Alabama

Attractively decorated in green and orange, in an appropriate design. Lithographed containers like this are permanent advertisements for their users.

Half the Sale is in the Package

Give your honey every chance—pack it in this lithographed container



YOU have to use some kind of package for your honey. Why not use the one that will do most to help sell your brand?

Lithographed cans give your honey its best chance. They re-invite old customers and attract new ones.

Here's a brilliant, sales-making honey pail, available to you at very reasonable cost. It carries your name and brand in the space indicated. It identifies your honey to your customers. It helps you build up a steady trade—your own trade.

Write for sample and details

American Can Company

NEW YORK CHICAGO SAN FRANCISCO PORTLAND, ORE.

American Can

CONTAINERS OF TIN PLATE • BLACK IRON • GALVANIZED IRON • FIBRE



BURR COMBS

The Making of a Beekeeper

By G. H. Cale.

It has been decided that this is not a place entirely for shop talk but also for fireside pleasantries: gossip whereby we may reveal personal and human affairs. Let us so consider it.

You know how one often daydreams, sees the things that have been, and wonders why they were so out of line with what had been planned? Lately I have been daydreaming quite a little. Although my chief activity is that of a beekeeper, it seems strange that it should be so. I did not start out "on my own" with any intentions of becoming a beekeeper.

Years ago, when just past the line where childhood ends, I became a floor boss in a toy factory, a responsibility which came by apparent accident. There seemed to be three ways open to me then—work, tramp or perish. I chose work as the most dignified of the three and found toy making in need of my muscles. Later my brains were hired and I found that their use was less tiresome and brought me more money than the muscle job.

The head of my department did not like girls. I did. The poor fellow had a crew of gay lassies to keep at work, but found the task hopeless. He worked them in groups, which was a fundamental mistake, since girls in groups, do not work. They talk. I suggested a rearrangement of their benches and the types of their work which distributed them singly among the machinery and other objects dividing the rooms. It was a success, as the increased output showed, and I became a "boss" forthwith.

This work was fun, but I formed the bad habit of personal comparisons, which led me to see that the fellows whom I admired the most were further up the ladder chiefly because they were better trained. An education became to my mind a prime necessity. I tried night school, studying drafting and shop problems, but results came so slowly that I finally left the girls and the shop and went through high school and to college.

I had firmly decided to become a chemist. There was much attraction and mystery in it; taking things apart to their basic elements and building therefrom entirely new substances. It puts into man's hands processes of creation and destruction

which glorify him. I would have surely become a chemist but for circumstance, that secret guiding power which so often turns us aside from our purposes.

In school, I had to earn much of my way and took any work that offered. Among the courses associated with chemistry were zoology and entomology, the study of animals and insects. Bees and beekeeping were a part of the entomology, and I found work caring for the apiary and buildings, developing some capacity for doing the work well. I have since come to believe that a constant application of the lessons we learn is one of the secrets of true education and I wish my boys to go to a school which recognizes this fact.

The beekeeping work carried me back to my younger days. My stepfather kept bees and his brother, F. H. Dewey, of Great Barrington, Mass., was the inventor of the Dewey foundation fastener, the forerunner of the Byard, Daisy and Woodman. I drew the patent drawings for the Dewey fastener and helped the inventor with his bees among the Berkshire hills.

Dr. Burton N. Gates was my teacher at college and also the Inspector of Apiaries for Massachusetts. He is a likeable chap and we mixed well. By his very enthusiasm he switched me completely from chemistry to bees. For two years I was his Deputy Inspector and thence drifted to University work in beekeeping and zoology in Maryland.

Between times, I had a longing for adventure, and went out to the Catskills in New York State where that good beekeeper, J. B. Merwin, of Prattsville, put in a whole season rubbing off my "green" and replacing it with real experience. With Merwin's three hundred colonies, I received my first real enthusiasm for beekeeping as a large scale occupation. There was so much enjoyment in that season's work that I decided I was to be a beekeeper henceforth.

I owe much to Merwin. I shall ever remember the first day in his home yard. Feet decked in fine black silks, my usual stockings, I went to the bees. They were insulted by the finery or the color and stung my ankles around my low shoes viciously, whereupon I danced and clapped my

hands to the offended spots, causing more stings. Someone laughed long and loud, and there, seated on a ladder, up an old apple tree sat Merwin. He will never forget that day, either. From then on I considered my initiation passed, and dressed respectably as a beekeeper.

When I returned to the University, circumstances switched things for me again. The war was on and Washington was the capital of the world. Work of all sorts speeded up. The Department of Agriculture was especially active and its work increased. Dr. Phillips, whose office is in that department, needed more men, and I was fortunate enough to be among the additions to his force. For the next four years I received a liberal education in beekeeping, both in practice and in fundamentals, which I prize above all else that has come to me in my beekeeping career. Phillips has succeeded in gathering in his laboratory the best possible facilities for the study of the beekeeping industry. To be with him and to learn from him was indeed a rare privilege. Demuth was in his office then and he also fathered me, giving unselfishly of his time and experience. I found Demuth not only a remarkable beekeeper but also a remarkable man. I have never met a man of finer character and I join heartily in any tribute that may be paid to him.

Those were strenuous days in Washington. Living expenses were enormous and most of us Department workers suffered from the pressure. I succeeded in keeping the wolf outside with the aid of 150 colonies of bees, but even so, the economic pressure was so fierce that I began to look for a way out. A good friend of mine told me that the Dadants needed an added man in their force. Hamilton seemed a long way off, but it was my good fortune to get here, and, better, to stay here.

So it is that a chemist became a beekeeper, with circumstance as the master of the fate. My niche seems to be here with the bees and the Journal, and I want to tell you folks that it is great fun to be so close to the thousands of good beekeepers who read these pages. With several hundred colonies of bees and with the "Old Reliable" to occupy my time, I shall never get into mischief great enough to cause harm.

**"The Lumber
That Lasts"**

FOR

**Bee Hives
Hive Bottoms
Hive Stands**

The only lumber that a well informed bee keeper will consider is genuine "ALL-HEART"

"OF COURSE"

**"TIDE WATER"
CYPRESS
"THE WOOD ETERNAL"**

"OF COURSE"

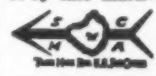
"Because, why?"—

Because he has learned by experience that "All-Heart" Tidewater Cypress resists rot to such a remarkable degree in all cases where extremes of weather conditions—hot or cold, wet or dry—have to be met and overcome, that it is "the only."

SOUTHERN CYPRESS MANUFACTURERS' ASSOCIATION
1251 Poydras Building, New Orleans, La., or 1251 Graham Building, Jacksonville, Fla.

YOUR LOCAL DEALER WILL SUPPLY YOU IF HE HASN'T ENOUGH "TIDEWATER" CYPRESS
LET US KNOW.

Insist on "Tide
Water" Cypress
—you can identify
it by this mark:



We have reduced our Glass and Tin honey container prices

2½ lb. Cans in crates of 100	\$3.50 a crate
5 lb. Pails in crates of 100	6.50 a crate
10 lb. Pails in crates of 50	5.00 a crate
60 lb. Tins, new, 2 tins per case	.90 a crate

GLASS JARS WITH GOLD-LACQUERED CAPS

8-oz. Capacity, 3 doz. per carton	\$1.35 per carton
16-oz. Capacity, 2 doz. per carton	1.20 per carton
3-lb. or quart, 1 doz per carton	.90 per carton

HONEY

Wyoming Water White Clover, 60-lb. tins, Crystallized	13c lb.
Light Amber West Indian, 60-lb tins, liquid	11c lb.

HOFFMAN & HAUCK, Inc.

1331 Ocean Avenue, Woodhaven, N. Y.

Good Extracting Demands High Speed

ROOT POWER EXTRACTORS are the only "*HIGH-SPEED*" extractors made, and the Buckeye is the best of our extensive line. Built to run *350 revolutions per minute* and with electrically welded baskets rigidly supported both top and bottom. Reverses quicker than any other extractor made. Experiments show that slow speed extractors leave from $\frac{1}{2}$ to 1 pound of honey in each comb, and authorities say that this honey is worse than wasted. Tests conducted during the past two seasons show repeatedly that only 2 or 3 ounces are left in the combs when Root's High Speed Extractors are used. There is a size for every need.



Buckeye Power Extractor with Pockets Partly Reversed.

Root "High Speed" Extractors Will Solve Your Extracting Problems

OTHER EXTRACTING EQUIPMENT

Storage Tanks, Capping Melters, Uncapping Cans, Honey Pumps, Wax Presses, Steam Heated
Uncapping Knife, Honey Strainers.

The A. I. Root Company, Medina, Ohio
West Side Station